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Chapter 4
Basic Building Blocks of the Cost of Equity Capital – Size Premium

Size as a Predictor of Equity Returns

The size effect is based on the empirical observation that companies of smaller size are associated with greater risk and, therefore, have greater cost of capital. The "size" of a company is one of the most important risk elements to consider when developing cost of equity capital estimates for use in valuing a business simply because size has been shown to be a *predictor* of equity returns. In other words, there is a significant (negative) relationship between size and historical equity returns – as size *decreases*, returns tend to *increase*, and vice versa.[1]

Traditionally, researchers have used market value of equity (market capitalization, or simply "market cap") as a measure of size in conducting historical rate of return studies. However, as we discuss later in this chapter, market cap is not the only measure of size that can be used to predict return, nor is it necessarily the best measure of size to use.

Much of the research of the size effect relies on the data provided by the Center for Research in Security Prices (CRSP) databases at the University of Chicago. The CRSP database includes U.S. equity total returns (capital appreciation plus dividends) going back to 1926.

The CRSP databases enabled researchers to look at stocks with different characteristics and analyze how their returns differed. One of the first characteristics that researchers analyzed was large-market-capitalization (large-cap) companies versus small-market-capitalization (small-cap) companies.

For example, a 1981 study by Rolf Banz examined the returns of New York Stock Exchange (NYSE) small-cap companies compared to the returns of NYSE large-cap companies over the period 1926–1975.[2] What Banz found was that the returns of small-cap companies were *greater* than the returns for large-cap companies. Banz's 1981 study is often cited as the first comprehensive study of the size effect.

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[1] This chapter is excerpted in part from Shannon P. Pratt and Roger J. Grabowski, *Cost of Capital: Applications and Examples*, 5th ed. (Hoboken, NJ: John Wiley & Sons, 2014).

[2] Rolf W. Banz, "The Relationship between Return and Market Value of Common Stocks," *Journal of Financial Economics* (March 1981): 3–18. This paper is often cited as the first comprehensive study of the size effect.

Possible Explanations for the Greater Returns of Smaller Companies

Some valuation analysts treat small firms as equivalent to scaled-down large firms. This is likely an erroneous assumption.

There are theoretical reasons for the greater returns of smaller companies (i.e., the "size effect"), which might include (i) small stocks are less liquid (with higher associated transaction costs), (ii) small stocks are riskier and harder to diversify, (iii) small stocks have higher betas which often are underestimated, (iv) investors must do more analysis per dollar invested, (v) investment data is less available.[3]

Valuation analysts also cite more practical reasons that small firms have risk characteristics that differ from those of large firms. For example, large firms may have greater ability to enter the market of the small firm and take market share away. Large companies likely have more resources to "weather the storm" in economic downturns. Large firms can generally spend more cash on R&D, advertising, and typically even have greater ability to hire the "best and brightest". Larger firms may have greater access to capital, broader management depth, and less dependency on just a few customers. A larger number of analysts typically follow large firms relative to small firms, so there is probably more information available about large firms. Small firms have fewer resources to fend off competition and redirect themselves after changes in the market occur.[4]

Any one of these differences (not an all-encompassing list) would tend to *increase* investors' required rate of return to induce them to invest in small companies rather than investing in large companies.

The size effect is not without controversy, nor is this controversy something new. Traditionally, small companies are believed to have greater required rates of return than large companies because small companies are inherently riskier. It is not clear, however, whether this is due to size itself, or to other factors closely related to or correlated with size (e.g., liquidity).[4,5] The qualification that Banz noted in his 1981 article remains pertinent today.

> *"It is not known whether size* [as measured by market capitalization] *per se is responsible for the effect or whether size is just a proxy for one or more true unknown factors correlated with size."*

In this chapter, we first present empirical evidence for the size effect, followed by a discussion of common criticisms of the size effect.

Credit: Roger Ibbotson

M. S. Long and J. Zhang, "Growth Options, Unwritten Call Discounts, and Valuing Small Firms," EFA 2001 Maastricht Meetings Paper no. 4057, March 2004. Available at [illegible]

Even after controlling for size, research suggests that liquidity is still a systematic factor and a predictor of returns. See Roger G. Ibbotson, Zhiwu Chen, Daniel Y. J. Kim, and Wendy Y. Hu, "Liquidity as an Investment Style," *Financial Analysts Journal* Vol. 69(3): 30–44, May/June 2013, and Roger G. Ibbotson, Ph.D., and Daniel Y. J. Kim, Ph.D., "Liquidity as an Investment Style: 2018 Update." Copies available at [illegible]. Most recently (2019) Ibbotson and colleagues Thomas M. Idzorek, CFA, Paul D. Kaplan, CFA, and James X. Xiong, CFA published a new Chartered Financial Analysts (CFA) Institute Research Foundation monograph entitled "Popularity: A Bridge Between Classical and Behavioral Finance," available for download at [illegible], or go to the CFA website at cfainstitute.org and search for "popularity."

The Size Effect: Empirical Evidence

Summary statistics over the 1926–2019 period for CRSP NYSE/NYSE MKT/NASDAQ[1] deciles 1–10 are shown in Exhibit 4 1 As size (in this case, as measured by market cap) *decreases*, return tends to *increase* For example, the annual arithmetic mean return of decile 1 (the largest-cap companies) was 11 25% over the 1926–2019 period, while the annual arithmetic mean return of decile 10 (the smallest-cap companies) was 19 87% Note that this increased return comes at a price risk (as measured by standard deviation) increases from 18 83% for decile 1 to 41 89% for decile 10 The relationship between risk and return is a fundamental principle of finance and for estimating the cost of capital

Exhibit 4.1: Summary Statistics of Annual Returns (CRSP NYSE/NYSE MKT/NASDAQ Deciles) 1926–2019

Decile	Geometric Mean (%)	Arithmetic Mean (%)	Standard Deviation (%)
1-Largest	9 53%	11 25%	18 83%
2	10 63%	12 86%	21 33%
3	11 08%	13 57%	23 16%
4	10 89%	13 79%	25 31%
5	11 32%	14 39%	25 91%
6	11 31%	14 68%	26 87%
7	11 60%	15 35%	28 75%
8	11 39%	15 84%	32 52%
9	11 44%	16 71%	36 65%
10-Smallest	13 08%	19 87%	41 89%

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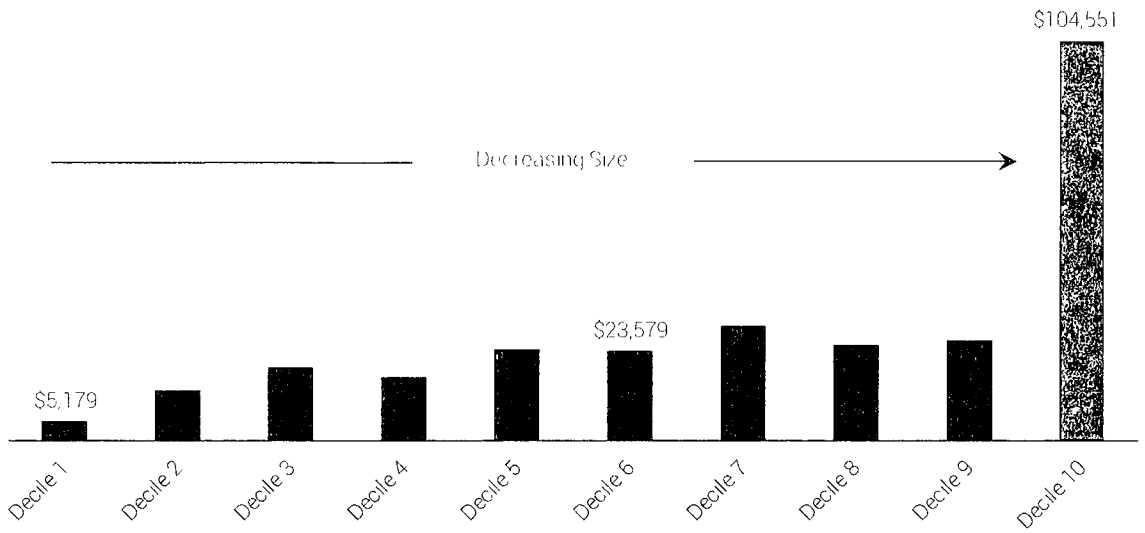
The Size Effect Over Longer Periods

Exhibit 4 2 illustrates the size effect As size (measured by market cap in this case) *decreases*, return tends to *increase* For example, an investment of $1 in CRSP decile 1 (comprised of the largest companies) at the end of 1925 would have grown to $5,179 by the end of 2019, and an investment in CRSP decile 6 (comprised of medium-sized companies) would have grown to $23,579 However, an investment of $1 in CRSP decile 10 (comprised of the smallest companies) would have grown to $104,551 over the same period

[1] On October 1, 2019, NYSE Euronext acquired the American Stock Exchange (AMEX). The NYSE MKT is the former American Stock Exchange or AMEX. The CRSP standard market cap based NYSE/AMEX/NASDAQ indices are now called the NYSE/NYSE MKT/NASDAQ indices.

Exhibit 4.2: Terminal Index Values of CRSP NYSE/NYSE MKT/NASDAQ Deciles 1–10
Index (Year-end 1925 = $1.00)
January 1926–December 2019



Source of underlying data: CRSP U.S. Stock Database and CRSP U.S. Indices Database ©2020 Center for Research in Security Prices, LLC (CRSP®). All rights reserved. CRSP® is a registered trademark and service mark of Center for Research in Security Prices, LLC and has been licensed for use by Duff & Phelps, LLC. The Duff & Phelps publications and services are not sponsored, sold or promoted by CRSP®, its affiliates or its parent company. To learn more about CRSP, visit www.crsp.com. CRSP NYSE/NYSE MKT/NASDAQ deciles 1-10. Used with permission. All rights reserved. Calculations performed by Duff & Phelps, LLC.

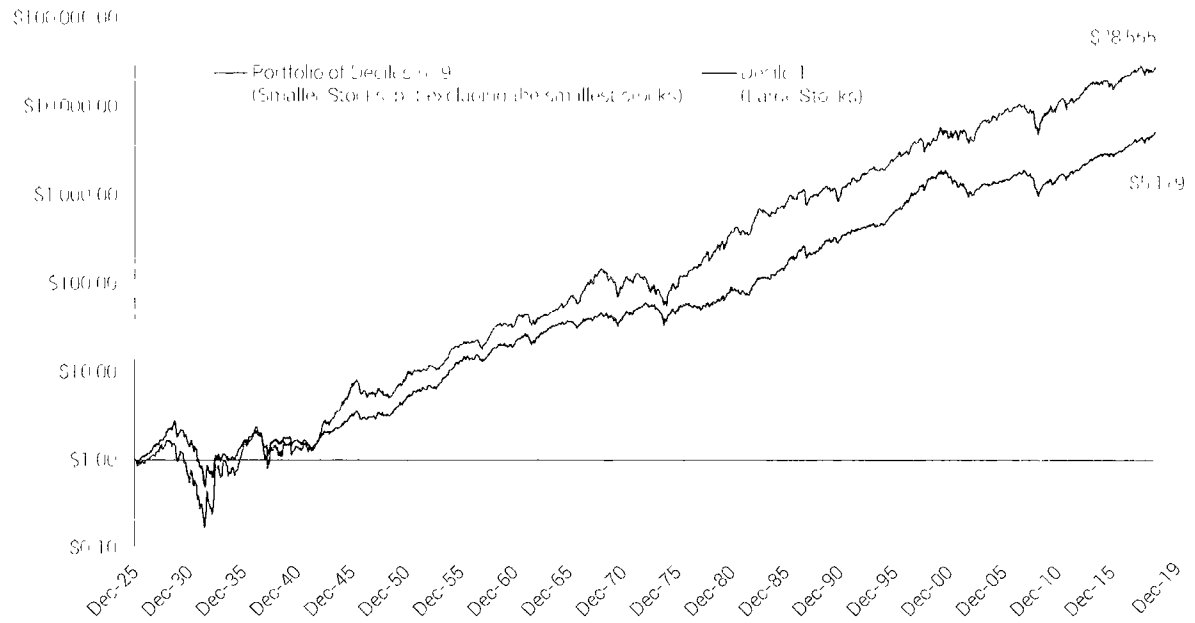
Exhibit 4.2 illustrates two other important concepts. The first is that the size effect is not "linear" – the size effect is clearly concentrated in the smallest-cap companies.

The second is that over longer periods of time the size effect is *not* just evident for the smallest companies, but is evident for all but the largest groups of companies, including companies with a market capitalization in excess of several billions of dollars.

To illustrate this, decile 1 (large-cap companies) is compared to a portfolio comprised of equal parts of deciles 6–9 in Exhibit 4.3. An investment of $1 in decile 1 at the end of 1925 would have grown to $5,179 by the end of 2019, while an investment of $1 in a portfolio comprised of equal parts of deciles 6–9 at the end of 1925 would have grown to $28,555 by the end of 2019 (remember decile 10, which is comprised of the smallest-cap companies, is *excluded* from this analysis). Even with decile 10 *excluded*, the portfolio made up of deciles 6–9 outperformed large-cap companies over the 1926–2019 period.

[1] Some researchers have suggested that the size effect is concentrated in even smaller firms than discussed here. Horowitz, Loughran and Savin found that if firms less than $5 million in value are excluded from the sample universe, the size effect becomes insignificant, at least as measured over the 1963–1997 time period. Joel L. Horowitz, Tim Loughran and N.E. Savin, "The disappearing size effect," *Research in Economics* (2000) 83-100.

Exhibit 4.3: Terminal Index Values of CRSP NYSE/NYSE MKT/NASDAQ Decile 1 and a Portfolio Comprised of equal parts of Deciles 6–9
Index (Year-end 1925 = $1.00)
January 1926–December 2019



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Small-cap companies do not always outperform large-cap companies. As a matter of fact, small-cap companies' shorter term behavior relative to large-cap companies can be quite erratic, so analyzing small cap companies' performance relative to large-cap companies' performance over varying holding periods may be instructive in revealing longer-term trends.

In Exhibit 4.4, the percentage of periods in which small-cap companies outperformed large-cap companies is analyzed over 1-, 5-, 10-, 20- and 30 year holding periods. As the holding period is increased, small-cap companies tend to outperform large-cap companies in a greater number of periods. In other words, the *longer* small-cap companies are given to "race" against large-cap companies, the greater the chance that small-cap companies outpace their larger counterparts. For example, small-cap companies outperformed large-cap companies 82.1% of the time over all 20-year holding periods from January 1926 through December 2019. In contrast, large-cap companies outperformed small-cap companies only 17.9% over the same holding and time period.

Exhibit 4.4: Percentage of Periods that Small-cap Companies Outperform Large-cap Companies over 1-, 5-, 10-, 20-, and 30-year Holding Periods (1926–2019)

Holding Period	1-year	5-years	10-years	20-years	30-years
Small-cap Companies Outperform (%)	52 4%	55 3%	69 4%	82 1%	91 3%
Large-cap Companies Outperform (%)	47 6%	44 7%	30 6%	17 9%	8 7%

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The Size Effect Tends to Stabilize Over Time

It may be instructive to examine the tendencies of small-cap stocks' performance versus large-cap stocks' performance over time periods with *fixed* starting dates and *variable* ending dates This will help to see what happens as more time periods are added (and thus the importance of "unusual" time periods is diminished)

In Exhibit 4 5, the average difference in annual returns for small-cap companies minus large-cap companies was calculated for periods with fixed starting dates of 1926 (the first year data is available from CRSP), 1963 (the Risk Premium Report Study are calculated over the time period 1963–2019), and 1982 (the year following publication of Banz's 1981 article) [4.9]

On the far left side of Exhibit 4 5 for the series "Fixed Beginning Date Starting 1926", the first data point is the average difference in annual return for small-cap companies minus large-cap companies in 1926, the second data point (moving to the right) is the average difference in annual return for small-cap companies minus large-cap companies over the period 1926–1927, and then 1926–1928, etc , until the final data point on the far right is the average difference in annual return for small-cap companies minus large-cap companies over the period 1926–2019

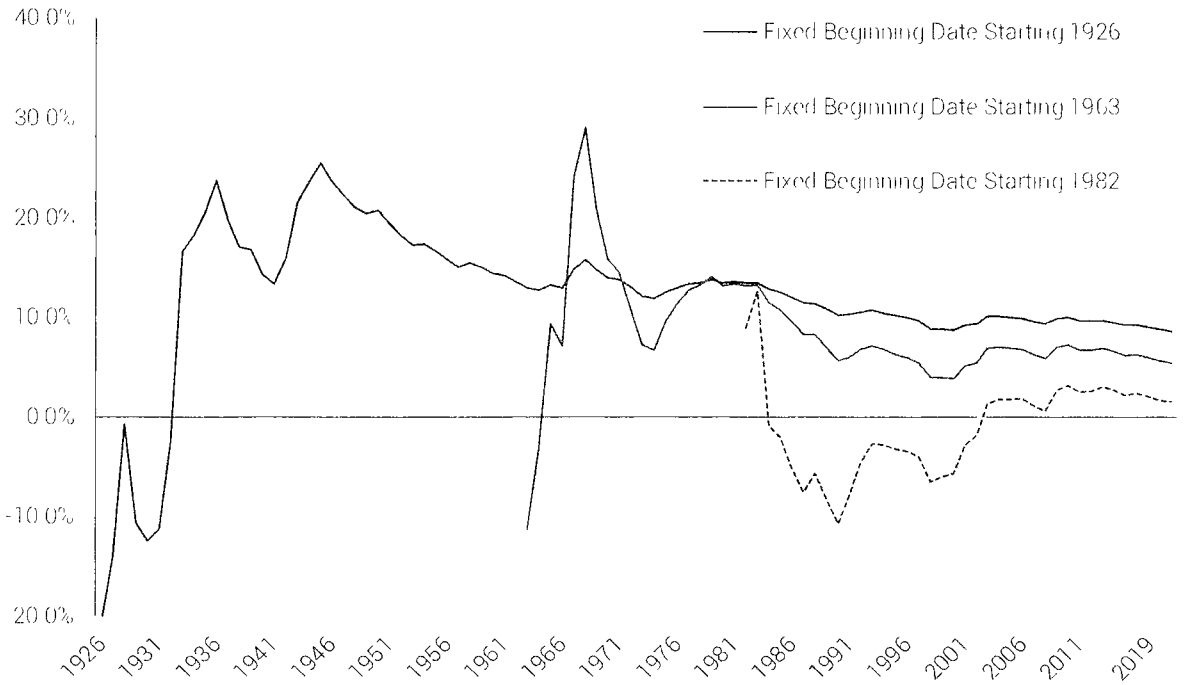
The same analysis is displayed for "Fixed Beginning Date Starting 1963", with the leftmost data point being the average difference in annual return for small-cap companies minus large-cap companies in 1963, and then (again, moving to the right) the average difference in annual return for small-cap companies minus large-cap companies over the periods 1963–1964, 1963–1965, etc , until the final data point on the far right is the average difference in annual return for small-cap companies minus large-cap companies over the period 1963–2019

And finally, the same analysis for "Fixed Beginning Date 1982" is shown, with the leftmost data point being the average difference in annual return for small-cap companies minus large cap companies in 1982, and the rightmost data point being the average difference in annual return for small-cap companies minus large-cap companies over the period 1982–2019

4.9 Banz, Rolf W "The Relationship between Return and Market Value of Common Stocks" *Journal of Financial Economics* (March 1981) 3 18 Banz's 1981 article demonstrated that smaller cap stocks exhibited significantly greater performance over larger-cap stocks over the period from 1926 to 1975

Exhibit 4 5 suggests that while the size effect measured over shorter time periods may be quite erratic (and even negative at times), there seems to be an overall tendency toward stability as time periods are added and the longer the period over which it is measured (regardless of the start date) Further, this stability seems to be reached in "positive territory" (the rightmost points in Exhibit 4 5), suggesting a positive size effect over time

Exhibit 4.5: CRSP Decile 10 minus Decile 1, Average Difference in Annual Returns
Fixed beginning date, variable ending dates
1926–2019, 1963–2019, 1982–2019

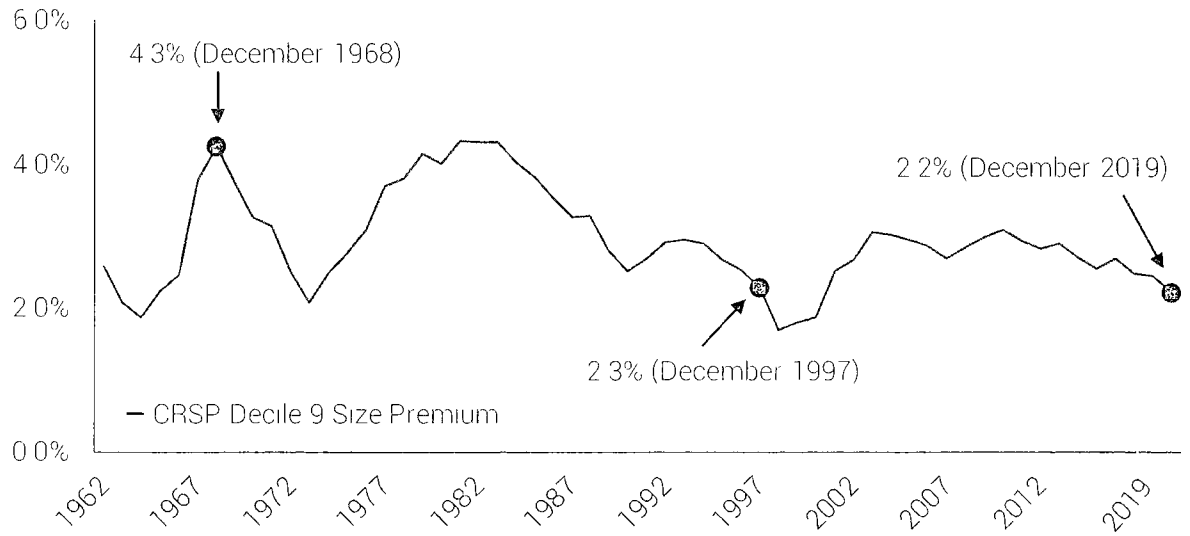


The Size Effect Changes Over Time

The variability of the size effect is illustrated in Exhibit 4 6 In Exhibit 4 6, the size premium for CRSP decile 9 (comprised of the smallest companies) is calculated as of each year-end from 1962–2019 using the same methodology and data set as is currently used in the Cost of Capital Navigator in the CRSP Deciles Size Study (and the same methodology and data set used previously in (i) the former *SBBI Valuation Yearbook*, and (ii) Duff & Phelps' *Valuation Handbook – U S Guide to Cost of Capital*, and now in the online Cost of Capital Navigator at dpcostofcapital.com, which replaced the *Valuation Handbook – U S Guide to Cost of Capital* in 2018)

For example, a hypothetical *Valuation Handbook* published in 1969 would have used data available from 1926–1968 to calculate CRSP decile 9's size premium, and this would have resulted in a size premium of approximately 4 3% In a hypothetical *1998 Valuation Handbook – U S Guide to Cost of Capital*, using data from 1926–1997, the size premium for CRSP decile 9 would have been approximately 2 3% And, in the 2019 Cost of Capital Navigator using data from 1926–2019, the size premium for CRSP decile 9 is 2 2%

Exhibit 4.6: CRSP Decile 9 Size Premium
Year-end 1962 to Year-end 2019



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These examples provide evidence that the size effect is *cyclical* That cyclicality is part of the risk of small companies, if small size companies *always* performed better than large companies, small size companies would be *less* risky than large-cap companies, not riskier This is true even though the expected returns are higher for small-cap companies in the long term By analogy, bond returns occasionally outperform stock returns For example, over the 10-year period ending December 2011, long-term U S government bonds returned 133 2% and the S&P 500 Index return 33 4%, yet few would contend that over time the expected return on bonds is greater than the expected return on stocks [1]

[1] Source of underlying data: Morningstar *Direct* database Calculations performed by Duff & Phelps, LLC

Criticisms of the Size Effect

The size effect is *not* without controversy, though, and various commentators question its validity In fact, some commentators contend that the historical data are so flawed that valuation analysts can dismiss all research results that support the size effect For example, is the size effect merely the result of not measuring beta correctly? Are there market anomalies that simply cause the size effect to appear? Is size just a proxy for one or more factors correlated with size, suggesting that valuation analysts should use those factors directly rather than size to measure risk? Is the size effect hidden because of unexpected events?

Is the Size Effect the Result of Incorrectly Measuring Betas?

Some commentators have held that the size effect is in part a function of underestimating betas for troubled firms (which tend to populate the smaller deciles where size is measured by market cap) Including troubled companies could cause the size premium to be overestimated in the CRSP 10th decile and the subdeciles 10a (and its upper and lower halves 10w and 10x) and 10b (and its upper and lower halves 10y and 10z), which are populated with the smallest companies as measured by market cap

The most commonly used size premia is derived based on an ordinary least squares regression (OLS) beta We examine two alternative methods of calculating the beta in order to compute a size premia, sum betas and annual betas

Effects of the Size Premia when Using OLS Betas, Annual Betas, and Sum Betas

Smaller companies generally trade more infrequently and exhibit more of a lagged price reaction (relative to the market) than do larger companies One of the ways of capturing this lag movement is called "sum" beta Sum betas are designed to compensate for the more infrequent trading of smaller company stocks

The sum beta estimates are greater for smaller companies than OLS betas, which are derived using non-lagged market benchmark data The net result of the *greater* sum betas (or greater annual betas) is *smaller* size premia

In Exhibit 4 7a, OLS betas and sum betas are calculated for the CRSP standard deciles 1–10 The OLS betas and sum betas for the portfolios comprised of larger companies are approximately the same

In Exhibit 4 7a, OLS betas, and sum betas are calculated for the CRSP standard deciles 1–10 The OLS betas and sum betas for the portfolios comprised of larger companies are approximately the same As we move from Decile 1 (comprised of the largest companies) to Decile 10 (comprised of the smallest companies), sum betas become increasing larger than their OLS counterparts For example, the OLS beta for decile 1 is 0 92, and the sum beta for decile 1 is also 0 92 The sum beta for decile 10, however (1 68), is significantly larger than the OLS beta for decile 10 (1 39)

All things held the same, the larger sum beta of decile 10 implies a smaller size premia (2 92%) than implied for its OLS beta counterpart (4 99%) (see Exhibit 4 7b) Sum betas tend to be larger for smaller companies than when using OLS betas As a result, they tend to be less plagued by the overestimation problem due to incorrectly measuring beta

Exhibit 4.7a: OLS Betas and Sum Betas, and their Respective Implied Size Premia, for CRSP NYSE/NYSE MKT/NASDAQ Deciles 1–10, as of December 31, 2019

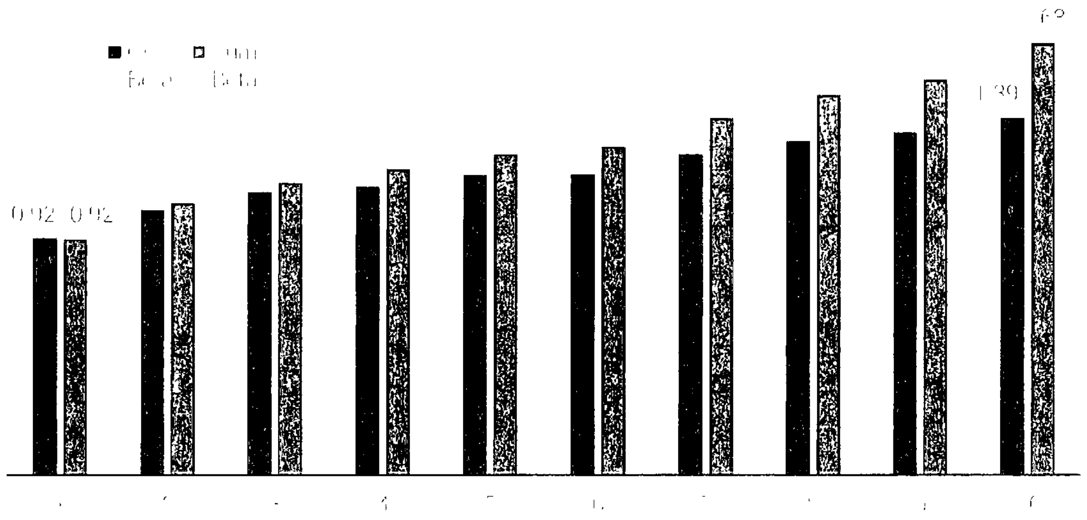
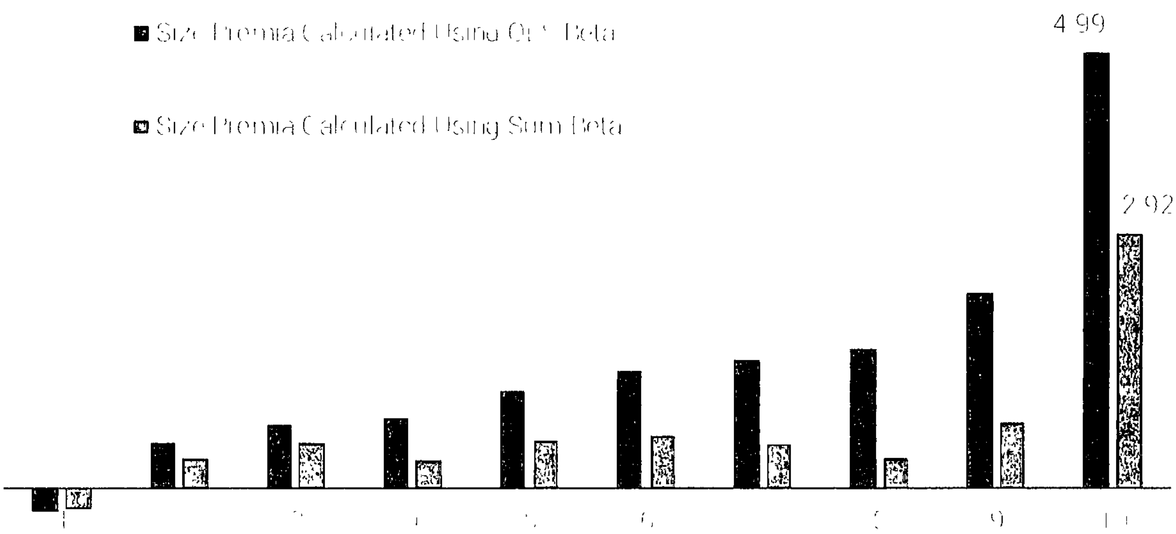


Exhibit 4.7b: Size Premia Calculated Using OLS Betas and Sum Betas, for CRSP NYSE/NYSE MKT/NASDAQ Deciles 1–10, as of December 31, 2019



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In applying the capital asset pricing model (CAPM) (particularly for smaller businesses), we are looking for the most *accurate* estimate, and not the most *expedient* one. If you use an OLS beta for a small company by multiplying the OLS beta times the equity risk premium (ERP) estimate and adding an OLS-based size premium, you may not arrive at as accurate an estimate of the cost of equity capital as by multiplying a sum beta times the ERP estimate and adding a sum-beta-based size premium. You should be using the most accurate estimate of beta and the most accurate measure of the appropriate size premium. Having said that, whatever type of beta you ultimately choose to employ, you should match the source of the size premium (OLS or sum beta) with the type of beta estimate you have chosen for your subject company.

For example, for internal consistency, one should use a size premium derived using an OLS beta when the subject company beta is an OLS beta, and one should use a size premium derived using sum betas when the subject company beta is a sum beta (Exhibit 4.8).

Exhibit 4.8: Potential Impact on Cost of Equity Capital, Matching (or Mismatching) the Type of Beta Used in the CAPM Equation to the Type of Beta Used to Develop the Size Premium

Beta Used to Develop Size Premia	Beta Used in CAPM Equation: OLS Beta	Beta Used in CAPM Equation: Sum Beta
OLS Beta	A even -	B Higher COE
Sum Beta	C Lower COE	D even

The resulting cost of equity capital resulting in the "matched" cases (Case A and Case D) do not necessarily have to equal (and likely will not), but they will tend to be within a reasonable range of each other. Using Cases B and C may lead to an incorrect estimate of cost equity capital. To be clear, we recommend using sum betas for the development of size premia, and to also use sum beta within the CAPM, (particularly if dealing with smaller companies), because sum betas tend to better explain the returns of smaller companies. However, in cases in which you do use OLS betas in CAPM, you should use an OLS beta derived size premium.

Data Issues

Critics of the size effect point out various issues with the data used, resulting in anomalies that people mistakenly have observed as the size effect. These data issues may include seasonality, bid/ask bounce bias, and delisting bias, among others.[4.10] In the following sections, we discuss the different compositions of portfolios in the CRSP Deciles Size Study data set and the Risk Premium Report Study data set.

Composition of the Smallest CRSP Deciles

We divided the CRSP 10th decile into subdeciles 10a and 10b (10a is the top half of the 10th decile, and 10b is the bottom half of the 10th decile) and further divided subdecile 10a into 10w and 10x, and subdecile 10b into 10y and 10z. This is the same breakdown of CRSP decile 10 that was previously presented in (i) the former Ibbotson Associates/Morningstar *SBBI® Valuation Yearbook*, and (ii) Duff & Phelps' *Valuation Handbook – U.S. Guide to Cost of Capital*, and now in the online Cost of Capital Navigator, which replaced the *Valuation Handbook – U.S. Guide to Cost of Capital* in 2018.

As of December 31, 2019, the reported size premium for the smallest 5% of companies by market capitalization as represented by CRSP subdecile 10b is 8.02%, and the size premium for the next smallest 5% of companies (as represented by CRSP subdecile 10a) is 3.49%, a difference of 4.53%.

What kind of companies populate subdeciles 10b and its top and bottom halves, 10y and 10z? The CRSP Deciles Size Study include all companies with no exclusion of speculative (e.g., start-up) or distressed companies whose market capitalization may be small because they are speculative or distressed. The inclusion of speculative or distressed companies in the database is one basis for criticism of the size effect. Exhibit 4.9 and Exhibit 4.10 display information about the types of companies that are included in decile 10y and decile 10z, respectively.[4.11]

[4.10] For a complete discussion of these issues, please refer to Pratt and Grabowski, op. cit., Chapter 15A, "Other Data Issues Regarding the 'Size Effect'."

[4.11] Exhibits 4.9 and 4.10 are as of September 2019 rather than December 2019 in order to mimic how the CRSP standard market cap based portfolios are formed. The CRSP deciles portfolio compositions are reset quarterly (March, June, September, December), and then portfolio returns are calculated for these portfolio compositions over the *subsequent* quarter. As of December 2019, the most recent "reset" is September 2019.

Exhibit 4.9: Breakdown of Decile 10y Companies Market Value of Equity between $62 612 and $120 178 million
September 30, 2019

Decile 10y	Market Value of Equity (in $millions)	Book Value of Equity (in $millions)	5-Year Average Net Income (in $millions)	Market Value of Invested Capital (in $millions)
95th Percentile	$116 965	$273 980	$12 747	$689 387
75th Percentile	102 170	91 188	3 361	172 148
50th Percentile	83 922	60 055	(5 934)	110 295
25th Percentile	70 292	25 012	(26 516)	86 475
5th Percentile	62 198	(25 986)	(48 265)	64 054

Decile 10y	Total Assets (in $millions)	5-Year Average EBITDA (in $millions)	Sales (in $millions)	Return on Book Equity (%)
95th Percentile	$1,157 626	$123 167	$1,113 930	25 7
75th Percentile	594 034	17 912	195 919	8 1
50th Percentile	126 477	(1 297)	47 486	(8 6)
25th Percentile	54 650	(20 222)	17 148	(65 3)
5th Percentile	13 370	(38 518)	2 333	(167 7)

Decile 10y	OLS Beta	Sum Beta
95th Percentile	2 48	2 77
75th Percentile	1 20	1 51
50th Percentile	0 52	0 82
25th Percentile	0 16	0 36
5th Percentile	0 01	0 07

Sources of underlying data: (i) CRSP U S Stock Database and CRSP U S Indices Database [illegible] Center for Research in Security Prices LLC (CRSP) All rights reserved CRSP is a registered trademark and service mark of Center for Research in Security Prices LLC and has been licensed for use by Duff & Phelps LLC The Duff & Phelps publications and services are not sponsored, sold or promoted by CRSP its affiliates or its parent company To learn more about CRSP visit [illegible] S&P *Capital IQ* Used with permission All rights reserved Calculations performed by Duff & Phelps LLC

Exhibit 4.10: Breakdown of Decile 10z Companies Market Value of Equity between $1 973 and $62 199 million
September 30, 2019

Decile 10z	Market Value of Equity (in $millions)	Book Value of Equity (in $millions)	5-Year Average Net Income (in $millions)	Market Value of Invested Capital (in $millions)
95th Percentile	$57 024	$103 409	$3 824	$241 805
75th Percentile	41 792	36 820	(0 771)	60 471
50th Percentile	26 444	15 583	(6 846)	35 658
25th Percentile	12 213	6 283	(17 109)	17 488
5th Percentile	4 548	(3 358)	(29 786)	6 894

Decile 10z	Total Assets (in $millions)	5-Year Average EBITDA (in $millions)	Sales (in $millions)	Return on Book Equity (%)
95th Percentile	$474 681	$23 884	$388 961	12 3
75th Percentile	91 740	2 431	66 759	(2 5)
50th Percentile	34 663	(3 055)	23 655	(46 5)
25th Percentile	15 799	(11 348)	6 205	(117 8)
5th Percentile	4 971	(23 206)	0 822	(215 1)

Decile 10z	OLS Beta	Sum Beta
95th Percentile	2 88	3 29
75th Percentile	1 61	2 00
50th Percentile	1 07	1 11
25th Percentile	0 54	0 53
5th Percentile	0 30	0 19

From these data we can conclude

- Betas used for calculating the size premium for subdecile 10y and subdecile 10z (using the OLS method of calculating betas) generally *understate* the beta, and therefore *overstate* the size premium. Note the small betas for companies in the 25th and 5th percentiles

- Subdecile 10y and subdecile 10z are populated by many large (but highly leveraged) companies with small market capitalizations that probably do not match the characteristics of financially healthy but small companies (see "Total Assets", 95th percentile measures)

Stocks of the *troubled* companies included in the data probably are trading like call options (unlimited upside, limited downside). Even if you were to use the sum beta method, the beta estimates would likely be underestimated and the size premium overstated (see "Return on Book Equity", 25th percentile and 5th percentile)

Before using the size premium data for 10b or its top and bottom halves, 10y and 10z, the valuation analyst likely should determine if the mix of companies that comprise the subdeciles are indeed comparable to the subject company

Composition of the Smallest Risk Premium Report Studies Portfolio

The Risk Premium Report Studies use a different methodology from the CRSP Deciles Size Studies. The Risk Premium Report Studies screen out speculative start-ups, distressed (i.e., bankrupt) companies, and other high-financial-risk companies. These studies measure beta using the sum beta method. This methodology was chosen to counter the criticism of the size effect by some that the size premium is a function of the high rates of return for speculative companies and distressed companies in the data set.

The Risk Premium Report Studies use the sum beta method to measure the size premium because it finds that betas of small companies in the data set (even after removing speculative, distressed, and other high-financial-risk companies) are underestimated if one uses the OLS method of estimating betas. Even after eliminating speculative, distressed, and other high-financial-risk companies and using the sum beta in measuring size, we still observe the size effect for a more recent period (since 1963).

The Risk Premium Report Study include a total of eight size measures, including six that are not based on market capitalization. Exhibit 4.11 shows the breakdown of companies in the Risk Premium Report Study in portfolio 25 (portfolio 25 is comprised of the smallest companies) for each of the eight size measures.

If the subject company is not highly levered, the companies in portfolio 25 may be more comparable to a small subject company, and therefore the size premium data for portfolio 25 may be more appropriate to use when dealing with very small companies.

Exhibit 4.11: Size Measure of Companies That Comprise Portfolio 25 of the Risk Premium Report Study
December 31, 2019

Portfolio 25	Market Value of Equity (in $millions)	Book Value of Equity (in $millions)	5-Year Average Net Income (in $millions)	Market Value of Invested Capital (in $millions)
Largest Company	$346 585	$187 069	$12 961	$439 393
95th Percentile	329 802	179 189	12 220	414 209
75th Percentile	235 400	135 075	8 441	307 248
50th Percentile	125 179	80 325	4 853	182 977
25th Percentile	55 321	38 712	2 222	72 063
5th Percentile	18 357	14 922	0 301	25 086
Smallest Company	3 766	8 224	0 028	9 643

Portfolio 25	Total Assets (in $millions)	5-Year Average EBITDA (in $millions)	Sales (in $millions)	Number of Employees
Largest Company	$364 117	$43 622	$344 600	750
95th Percentile	339 038	40 055	317 697	700
75th Percentile	282 617	29 905	226 905	516
50th Percentile	162 848	16 719	113 459	284
25th Percentile	64 519	7 278	51 107	119
5th Percentile	26 638	2 284	22 465	10
Smallest Company	12 853	0 622	5 919	3

Financial services companies (i.e., SIC code 6, those companies in finance, insurance, or real estate) are *excluded* from Risk Premium Report Study portfolios, primarily because some of the financial data used in the Risk Premium Report Study is difficult to apply to companies in the financial sector (e.g., "sales" at commercial banks). In addition, financial services companies tend to support a much higher ratio of debt-to-equity than do other industries, and so including them with non-financial firms may be an apples-to-oranges comparison that could lead to improperly skewed results. Moreover, companies in the financial services sector were poorly represented during the early years of the Standard & Poor's *Compustat* database.

Because companies in SIC code 6 are excluded from the set of companies used to perform the analyses presented in the Risk Premium Report, the data should not be used by an analyst estimating the cost of equity capital for a financial services company or other company in SIC code 6.

We also publish accounting-based fundamental risk information about the companies that comprise the 25 size-ranked portfolios for *each* of the eight size measures analyzed in the Risk Premium Report Study. This information includes:

- Five-year average operating income margin
- Coefficient of variation in operating income margin
- Coefficient of variation in return on book equity

The first statistic measures profitability, and the latter two statistics measure volatility of earnings.

This information provides the analyst with two important capabilities:

1. Additional tools to determine if the mix of companies that comprise the Risk Premium Report's portfolios are indeed comparable to the subject company.
2. The opportunity to gauge whether an increase (or decrease) adjustment to a risk premium or size premium (and thus cost of equity capital) is indicated, based on the company-specific differences of the subject company's fundamental risk and the average fundamental risk of companies that make up the portfolios from which the risk premia are derived. (For more information, see the section entitled "Comparative Risk Study" in Chapter 10.)

Has the Size Effect Disappeared in More Recent Periods?

Some research has suggested that in more recent years the size effect is greatly diminished, or has disappeared altogether. Often, 1981 is identified as the year after which the size effect has either diminished or disappeared. The primary reason for this is that in 1981 Banz examined the returns of NYSE small-cap companies compared to the returns of NYSE large-cap companies over the period 1926–1975, and found that there was a negative relationship between size—as measured by market capitalization—and return (i.e., as market capitalization *decreases*, returns *increase*). In effect, Banz is said to have "let the cat out of the bag" that small-cap companies offered greater returns, and that attracted more investment in small-cap companies. Prices were bid up, thus reducing overall returns for this asset class.

Hou and van Dijk posited that the apparent disappearance of the size effect after the early 1980s was due to cash flow shocks. Realized returns for small companies were generally less than expected because of negative cash flow shocks, and realized returns for large companies were generally greater than expected because of positive cash flow shocks.[1] What caused these unexpected cash flow shocks?

The number of newly public firms in the United States increased dramatically in the 1980s and 1990s compared with prior periods, and the profitability and survival rate of the newly public firms

[1] Kewei Hou and Mathijs A. van Dijk, "Resurrecting the size effect: Firm size, profitability shocks, and expected stock returns." Ohio State University Fisher College of Business working paper March 31, 2014. Copy available at http://[illegible]

was generally less than the profitability and survival rates for firms that went public in previous years. After adjusting realized returns for the cash flow shocks, the result was that returns of small firms on a pro forma basis exceeded the returns of large firms by approximately 10% per annum, consistent with the size premium in prior periods.

A more direct reason often cited for a diminished size effect in more recent years was possibly most succinctly stated by Horowitz, Loughran, and Savin, who suggested that "it is quite possible that as investors became aware of the size effect, small firm prices increased (thus lowering subsequent returns)."[3] This conjecture may be supported by the sheer number of small-cap companies that have come into existence since Banz's 1981 article that demonstrated that small-cap companies exhibited significantly greater performance over the period from 1926 to 1975.[4]

In a more recent study, the authors found the size effect exists and is statistically significant when one accounts for quality differences among companies. They found that a key variable in explaining the changing size effect over time is the markets pricing of firm quality (as measured by profitability, stability, growth and safety) versus junk. They find that this relationship has a far stronger explanatory power than other factors (relationship of size to the market, value, or momentum). This finding holds whether size is measured by market capitalization or non-market based ("fundamental") measures. Further, this finding holds for each of the 30 industries and 23 countries studied. Further, they found that the size effect holds in periods where other researchers have claimed the size effect has disappeared. The authors also found that the size effect holds not only during the month of January (the "January effect") but through other months as well.

In another recent study the author finds that when one examines established (i.e., companies that are not start-up), profitable companies and not financially distressed, there is strong evidence supporting the size effect including in periods where other researchers have claimed the size effect has disappeared.[5][6]

Size Effect: The Big Picture On Small versus Large

We performed analyses to investigate which of two hypothetical investors would have ended up with more money in their pocket over various holding periods within the full range of monthly CRSP decile data (January 1926–December 2019).

- "Investor A" invests only in large-cap companies.
- "Investor B" only invests in small-cap companies.

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[3] Jeff Horowitz, Tim Loughran, and Nejat Savin, "The Disappearing Size Effect," *Research in Business and Economics Journal*, 2000, page 96.

[4] Banz, Rolf W., "The Relationship between Return and Market Value of Common Stocks," *Journal of Financial Economics*, (March 1981): 3-18. Professor Banz's 1981 article is often cited as the first comprehensive study of the size effect.

[5] Asness, Clifford S., Andrea Frazzini, Ronen Israel, Tobias J. Moskowitz, and Lasse Heje Pedersen, "Size Matters, If You Control Your Junk," *Journal of Financial Economics*, 129 (2018): 479-509.

[6] Grabowski, Roger J., "The Size Effect Continues to Be Relevant When Estimating the Cost of Capital," *Business Valuation Review*, 37 (3) (2018).

To do this, we first calculated the terminal index value of $1.00 invested for every possible combination of monthly start-dates and end-dates for CRSP decile 1 (comprised of the largest-cap companies) and CRSP decile 10 (comprised of the smallest-cap companies) over the January 1926 to December 2019 period.[4] The total number of monthly start-dates and end-dates combinations between January 1926 and December 2019 is 636,756.

We then subtracted the terminal index value of large-cap companies from the terminal index value of small-cap companies for *each* of the 636,756 start-date/end-date combinations. If the terminal index value of small-cap companies was *greater* than the terminal index value of large-cap companies, this would indicate small-cap companies earned a *higher* return over that period for the investor.

Example: $1.00 invested in large-cap companies from January 1926 would have grown to $5,179.41 by the end of December 2019. Alternatively, $1.00 invested in small-cap companies from January 1926 would have grown to $104,550.91 by the end of December 2019. Investing in small-cap companies would have resulted in $99,371.50 ($104,550.91 – $5,179.41) *more* money in your pocket than investing in large-cap companies over this period.

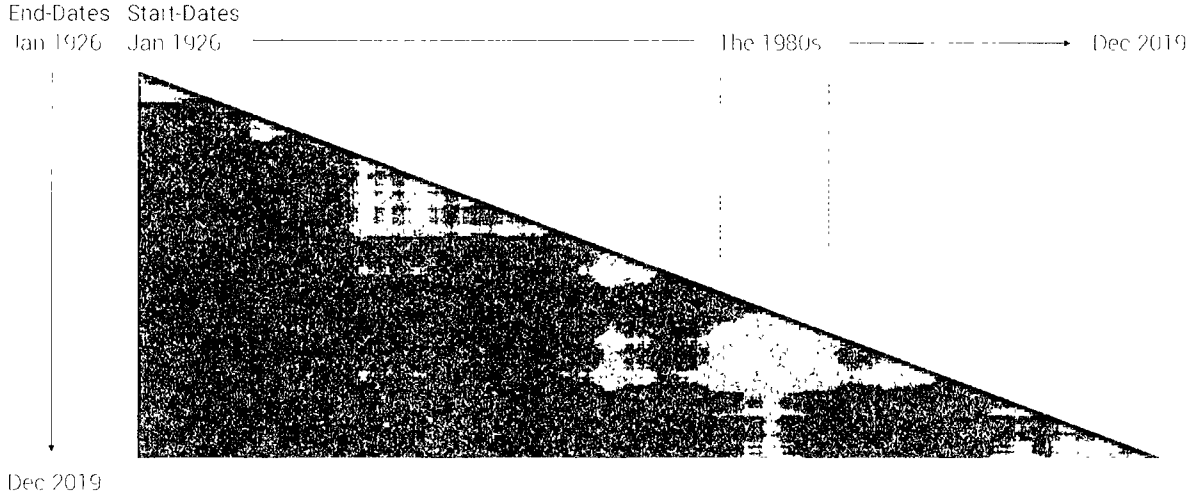
These calculations were performed for *every* possible monthly start-date and end-date combination between January 1926 and December 2019. The result of this analysis was that small-cap companies outperformed large-cap companies in 536,452 of the cases (84.2%), and large-cap companies outperformed small-cap companies in 100,304 cases (15.8%).

These results are shown in Exhibit 4.12, where the difference in the terminal index value between small-cap companies and large-cap companies for all 636,756 possible start-date/end-date combinations from January 1926 to December 2019 are mapped. In Exhibit 4.12, if the terminal index value for small-cap companies is *greater* than the terminal index value for large-cap companies over a start-date/end-date combination (i.e., small-cap companies outperformed large-cap companies over that period), it is shown in red (536,452 cases). Alternatively, if the terminal index value for small-cap companies is *less* than the terminal index value for large-cap companies over a start-date/end-date combination (i.e., large-cap companies outperformed small-cap companies over that period), it is shown in gray (100,304 cases).

The significance of the large gray area in Exhibit 4.12 under start-dates that begin in the 1980s will be discussed in more detail later in this chapter.

[4] The terminal index value in all cases presented here is the amount that $1 invested on the start date would have grown to (or decreased to) as of the end date. All terminal index values in this section are calculated geometrically.

Exhibit 4.12: CRSP Decile 10 (small-cap companies) Terminal Index Values *Minus* CRSP Decile 1 (large-cap companies) Terminal Index Values for 636,756 Start-Date/End-Date Combinations, Red = Small-Cap Companies Outperformed Large-Cap Companies Over the Period, Gray = Large-Cap Companies Outperformed Small-Cap Companies Over the Period
January 1926–December 2019



Source of underlying data: CRSP U.S. Stock Database and CRSP U.S. Indices Database © 2020 Center for Research in Security Prices, LLC (CRSP®). All rights reserved. CRSP® is a registered trademark and service mark of Center for Research in Security Prices, LLC and has been licensed for use by Duff & Phelps, LLC. The Duff & Phelps publications and services are not sponsored, sold or promoted by CRSP, its affiliates or its parent company. To learn more about CRSP visit [illegible]. Large-cap companies and small-cap companies are represented by CRSP NYSE/NYSE MKT/NASDAQ deciles 1 and 10, respectively. Used with permission. All rights reserved. Calculations performed by Duff & Phelps, LLC.

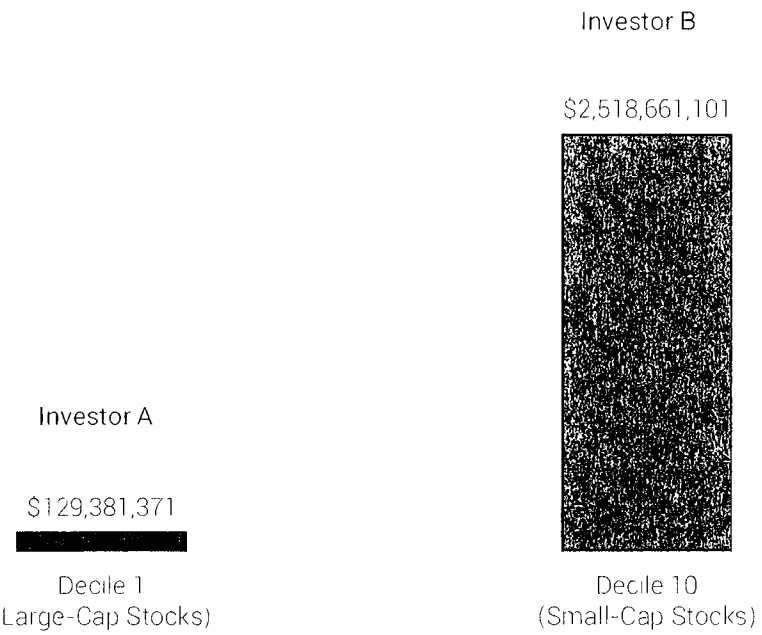
The results in Exhibit 4.12 are merely a record of whether small-cap companies outperformed large-cap companies, or vice versa, over the 636,756 possible start-date/end-date periods, with no regard to the *magnitude* of the outperformance. The "magnitude" of overperformance can be illustrated with the following example.

If hypothetical Investor A, who invests only in CRSP Decile 1 (comprised of the *largest* companies), had invested $1 in *each* of the 636,756 possible start-date/end-date investment horizons between January 1926 and December 2019, her $636,756 total investment would have grown to $129,381,370.60 (i.e., $129.4 million, see Exhibit 4.13).

Alternatively, if hypothetical Investor B, who invests only in CRSP Decile 10 (comprised of the *smallest* companies), had invested $1 in each of the 636,756 possible start-date/end-date investment horizons between January 1926 and December 2019, his $636,756 total investment would have grown to $2,518,661,101 (i.e., $2.5 billion).

Investor B, who invested only in small companies, ends up with 19.5 times as much money in his pocket ($2,518,661,101 – $129,381,370.60) than Investor B, who only invests in large companies.

Exhibit 4.13: Proceeds From an Investment of $1 in *Each* of the 636,756 Possible Start-Date/End-Date Investment Horizons Between January 1926 and December 2019, "Investor A" invests only in large-cap stocks, "Investor B" invests only in small-cap stocks



Source of underlying data: CRSP U.S. Stock Database and CRSP U.S. Indices Database © 2020 Center for Research in Security Prices, LLC (CRSP®). All rights reserved. CRSP® is a registered trademark and service mark of Center for Research in Security Prices, LLC and has been licensed for use by Duff & Phelps, LLC. The Duff & Phelps publications and services are not sponsored, sold or promoted by CRSP®, its affiliates or its parent company. To learn more about CRSP, visit www.crsp.org. Large cap companies and small cap companies are represented by CRSP NYSE/NYSE MKT/NASDAQ deciles 1 and 10, respectively. Used with permission. All rights reserved. Calculations performed by Duff & Phelps, LLC.

Size Effect: A Closer Examination

In Exhibit 4.14, a more detailed summary of these results is shown, where the holding periods are limited to *exactly* 1 month, 5-years, 10-years, 20-years, and 30 years, instead of all 636,756 possible start-date and end-date combinations. The entire January 1926–December 2019 period is examined, as well as three more recent start date windows: April 1981–December 2019, January 1990–December 2019, and January 2000–December 2019. All three of these three more recent periods are *after* Banz wrote his March 1981 article that identified the size effect, and so they are labeled "Post Banz."

In Exhibit 4.14 the number of periods examined is shown first, followed by the outperformance percentage of the total periods in parentheses.

Exhibit 4.14: Small-cap Companies' Performance minus Large-cap Companies' Performance Over Periods of Exactly 1, 60, 120, 240, and 360 Months
January 1926–December 2019

Holding Period	All Dates Jan 1926–Dec 2019	Post Banz Apr 1981–Dec 2019	Post Banz Jan 1990–Dec 2019	Post Banz Jan 2000–Dec 2019
Exactly 1 month				
Small Stocks Outperform	531 (47%)	213 (46%)	174 (48%)	123 (51%)
Large Stocks Outperform	597 (53%)	252 (54%)	186 (52%)	117 (49%)
Exactly 60 months (5 years)				
Small Stocks Outperform	591 (55%)	177 (44%)	172 (57%)	108 (60%)
Large Stocks Outperform	478 (45%)	229 (56%)	129 (43%)	73 (40%)
Exactly 120 months (10 years)				
Small Stocks Outperform	700 (69%)	187 (54%)	187 (78%)	88 (73%)
Large Stocks Outperform	309 (31%)	159 (46%)	54 (22%)	33 (27%)
Exactly 240 months (20 years)				
Small Stocks Outperform	730 (82%)	179 (79%)	121 (100%)	1 (100%)
Large Stocks Outperform	159 (18%)	47 (21%)	0 (0%)	0 (0%)
Exactly 360 months (30 years)				
Small Stocks Outperform	702 (91%)	92 (87%)	1 (100%)	–
Large Stocks Outperform	67 (9%)	14 (13%)	0 (0%)	–

Source of underlying data: CRSP U.S. Stock Database and CRSP U.S. Indices Database © 2020 Center for Research in Security Prices LLC (CRSP®). All rights reserved. CRSP® is a registered trademark and service mark of Center for Research in Security Prices LLC and has been licensed for use by Duff & Phelps, LLC. The Duff & Phelps publications and services are not sponsored, sold or promoted by CRSP®, its affiliates or its parent company. To learn more about CRSP visit www.crsp.chicagobooth.edu. Large-cap companies and small cap companies are represented by CRSP 1 NYSE/NYSE MKT/NASDAQ deciles 1 and 10 respectively. Used with permission. All rights reserved. Calculations performed by Duff & Phelps, LLC.

In the top row of Exhibit 4.14 (in which the holding period is restricted to a single month), large-cap companies outperformed small-cap companies in the January 1926–December 2019 period (53%), and in the "Post-Banz" April 1981–December 2019 and January 1990–December 2019 time horizons (54% and 52%, respectively). In the more recent January 2000–December 2019 time horizon small-cap companies outperformed 51% of the time.

As the holding period is increased, and the time that small-cap companies and large-cap companies are given to "race" against each other is lengthened, small-cap stocks tend to *increasingly* outperform large-cap stocks. For example, over the entire range January 1926–December 2019 (see leftmost column of Exhibit 4.14), as the holding period is increased to 60 months (5-years), to 120 months (10-years), to 240 months (20-years) and finally to 360 months (30-years), small stocks increasingly outperform large stocks (55%, 69%, 82%, and 91% of the time, respectively).

This same pattern of *increasing* outperformance of small stocks as the holding period is *increased* can also be seen in the three "Post Banz" periods

The 1980s and the Size Effect

To examine the significance of the large gray area under start-dates that begin in the 1980s previously alluded to in Exhibit 4 12, we performed the following analysis

1 All possible and *identical* "240-month x 240-month" sized wedges that exist in the larger "wedge" shown in Exhibit 4 12 were identified Over the time period January 1926–December 2019, the number of possible and identical 240-month x 240-month sized wedges in Exhibit 4 12 is 889 [8]

2 We calculated the proceeds from our hypothetical **Investor A** investing $1 in *each* of the 28,920 possible and identical start-date/end-date investment horizons in *each* of the "240-month x 240-month" sized wedges (Investor A invests only in CRSP Decile 1, which is comprised of the largest companies)

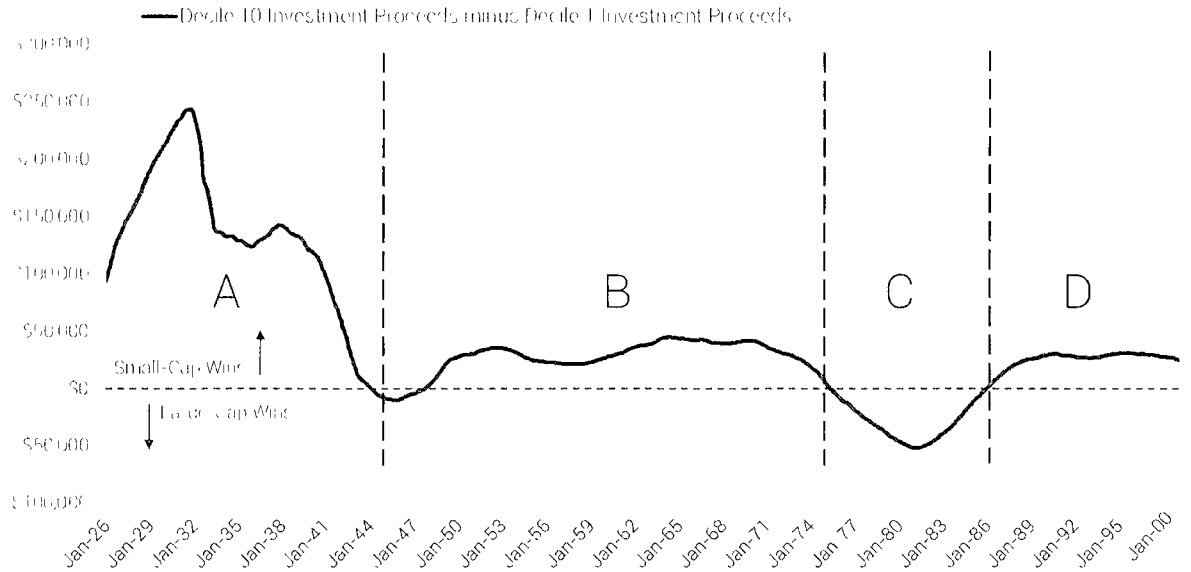
3 We calculated the proceeds from our hypothetical **Investor B** investing $1 in *each* of the 28,920 possible and identical start-date/end-date investment horizons in *each* of the "240-month x 240-month" sized wedges (Investor B invests only in CRSP Decile 10, which is comprised of the smallest companies)

4 Finally, for each of the 889 "240-month x 240-month" sized wedges, Investor A's "large-cap company" investment proceeds were subtracted from Investor B's "small-cap company" investment proceeds

The results of this analysis are shown in Exhibit 4 15 (Next Page)

[8] By "identical" we mean (i) each wedge is exactly 240 months x 240 months (20 years) in size, and (ii) the possible start-date/end-date combinations within each of the 889 "240-month x 240-month wedges" are identical in number (28,920), and (iii) each of the 28,920 possible start-date/end-date combinations within each of the 889 "240-month x 240-month wedges" has an *exact* equivalent possible start-date/end-date combination in each of the other 889 "240-month x 240-month wedges" Thus for each of the 889 wedges, the number of periods measured and the length of those periods is exactly identical to the number of periods and length of periods in each of the other 889 wedges

Exhibit 4.15: Investor A's "large-cap company" Investment Proceeds Subtracted from Investor B's "small-cap company" Investment Proceeds for Each Possible and Identical "240-month x 240-month" Sized Wedge from January 1926–December 2019



Note: *January 2000 is the last "start month" for which a "240-month x 240-month" sized wedge could be calculated ending Dec 31, 2019*

Each of the 889 points that comprise the solid red line in Exhibit 4.15 (i) is made up of the results of 28,920 separate investments of $1 in *each* of 28,920 start-date/end-date time periods in the given "240-month x 240-month" wedge being examined, and (ii) is directly comparable to every other point in the graph. In other words, there are a lot of observations in Exhibit 4.15, and those observations are all comparable to each other in an "apples to apples" fashion.

In Exhibit 4.15, if the investment proceeds of investing in small-cap companies are *greater* than the investment proceeds of investing in large-cap companies, the red line is *above* the dashed horizontal "$0" line. Alternatively, if the investment proceeds of investing in small-cap companies are *less* than the investment proceeds of investing in large-cap companies, the red line is *below* the dashed horizontal "$0" line.

There are at least four observations about the results shown in Exhibit 4 15

- **Observation 1:** Small-cap companies usually win Investor B's "small-cap company" investment proceeds were *greater* than Investor A's "large-cap company" investment proceeds in 717 (80 7%) of the 889 identical "240-month x 240-month" wedges examined

- **Observation 2:** Small-cap companies outperformed large-cap companies to a greater degree in *earlier* periods (see area "A" in Exhibit 4 15)[40] than they did in *later* periods (see areas "B", "C", and "D")

- **Observation 3:** Small-cap companies performed *poorly* relative to large-cap companies in the "240-month x 240-month" wedges that overlap the 1980s (see area "C" in Exhibit 4 15)

- **Observation 4:** As soon as the influence from the 1980s is in the rear-view mirror, small-cap companies seem to regain their footing, and the size effect in area "D" seems to return to what it was in area "B"[41]

Controlling for Small-Cap Companies' Significant Outperformance of Large-Cap Companies in Earlier Periods

This section started with the question of whether the size effect has disappeared in more recent periods The empirical evidence presented thus far suggests that the size premia is likely alive and well, even in the periods following the 1981 publication of Rolf Banz's seminal article[42] However, the evidence also suggests that the size effect may be of *diminished* strength in more recent years, especially when compared to very early periods

For example, one of the four observations about the results in Exhibit 4 15 was that small-cap companies outperformed large-cap companies to a greater degree in the *earlier* periods of 1926–1945 (see area "A" in Exhibit 4 15) than they did in *later* periods One might reasonably reckon that "most" of the size effect over the 1926–2019 time horizon happened in the earlier years, as represented by the 20-year period from 1926–1945 (see area "A" in Exhibit 4 15), and that if these early years were controlled for (i e , "excluded ") in the calculations of size premia, that the size premia might be severely weakened, or disappear altogether

[40] Area "A" represents the first 20 years of Exhibit 4 15 (i e , 1926–1945) "1926–1945" was arbitrarily selected to represent the earlier years in Exhibit 4 15 For example, 1926–1944 (or even 1943) could just as easily have been selected 1926–1945 was selected because it is a round 20 year period

[41] Dimson Marsh and Staunton address this in a recent paper "Over the period 1984–1997, the small cap premium turned negative although, ironically, after we highlighted the demise of the size effect U S small caps performed very well over the first decade of the 21st century in both relative and absolute terms" See Elroy Dimson Paul March and Mike Staunton *The Journal of Portfolio Management* Special QES Issue 2017 43 (5) 15–37 DOI [illegible]

[42] Banz, Rolf W "The Relationship between Return and Market Value of Common Stocks" *Journal of Financial Economics* (March 1981) 3–18 Professor Banz's 1981 article is often cited as the first comprehensive study of the size effect

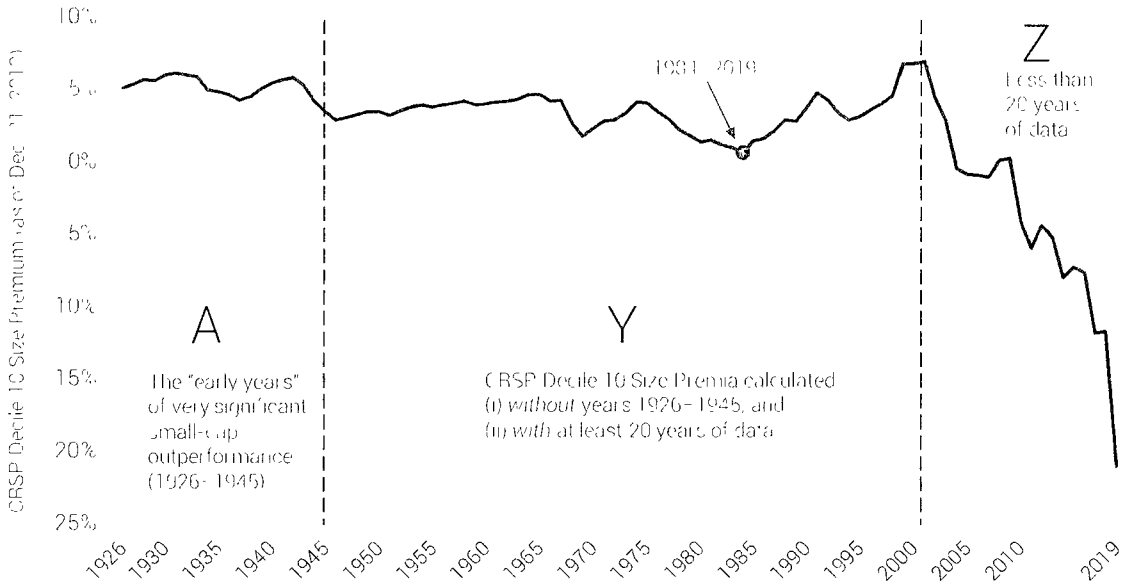
We tested to see what would happen if the first 20 years (1926–1945), a period during which the size effect was stronger than it was in later periods, were *excluded* from the calculations of 2019 year-end size premia. In Exhibit 4.16, the results of this analysis are shown. The solid red line in Exhibit 4.16 is the size premium for CRSP Decile 10, as of December 31, 2019, calculated as if the CRSP data started in *each* year from 1926–2019 (instead of just 1926).

For example, the leftmost point in Exhibit 4.16 is the size premium for CRSP Decile 10 calculated over the time period 1926–2019 (94 years). The second-most leftmost point in is the size premium for CRSP Decile 10 as of December 31, 2019 calculated over the time period 1927–2019 (93 years), the third-most leftmost point is the size premium for CRSP Decile 10 as of December 31, 2019 calculated over the time period 1928–2019 (92 years), etc., etc., until the *rightmost* point in Exhibit 4.16 is the size premium for Decile 10 as of December 31, 2019 calculated over the time period 2019–2019 (1 year).

Area "A" in Exhibit 4.16 is the equivalent of area "A" from Exhibit 4.15. Area "A" in both exhibits is represented by the "early years" of 1926–1945, during which small-cap companies' outperformance of large-cap was significantly greater than it was in later periods. In area "A" in Exhibit 4.16, the year-end 2019 CRSP Decile 10 size premia is calculated with start-years of 1926–1945, and a *constant* end-year of 2019.

Area "Z" of Exhibit 4.16 is the year-end 2019 CRSP Decile 10 size premia as of December 31, 2019 calculated with start-years of 2001–2019, and a *constant* end-year of 2019. Each of the calculations in area Z includes less than 20 years of data, and is therefore excluded from any further analysis because of the short time horizon over which they are calculated.

Exhibit 4.16: CRSP Decile 10 Size Premium Calculated Through 2019 (in each case), and *Different* Start-Years (1926–2019)



Variable start year (1926–2019) *Constant* end year (end year is always December 31, 2019)

Sources of underlying data: (i) CRSP U.S. Stock Database and CRSP U.S. Indices Database © 2020 Center for Research in Security Prices, LLC (CRSP®). All rights reserved. CRSP® is a registered trademark and service mark of Center for Research in Security Prices, LLC and has been licensed for use by Duff & Phelps, LLC. The Duff & Phelps publications and services are not sponsored, sold or promoted by CRSP, its affiliates or its parent company. To learn more about CRSP visit [illegible].com (ii) Morningstar, Inc. Used with permission. All rights reserved. Calculations by Duff & Phelps.

The real area of interest in Exhibit 4.16 is area "Y". In area "Y" the year-end 2019 CRSP Decile 10 size premia is calculated with start-years of 1946–2000, and a *constant* end-year of 2019. Note that the 94 points that comprise the red line in Exhibit 4.16 are *not* "apples to apples" comparable, because the time horizon over which each point is calculated is *different* (94 years, 93 years, 92 years, etc.). However, the size premia in area "Y" are each calculated with *at least* 20 years of data.[1]

All of the size premia in area "Y" are also calculated *without* any data from 1926–1945, the area "A" years in which small-cap companies' outperformance of large-cap companies was significantly greater than it was in later periods. In other words, the huge small-cap outperformance of the 1926–1945 period has been "controlled for" (i.e., excluded) in all size premia calculations in area "Y".

The resulting CRSP Decile 10 size premia calculated area "Y" are all positive, even after controlling for the huge small-cap outperformance of the "early years" in area "A". As a matter of fact, all but one data point (i.e., the year-end 2019 CRSP Decile 10 size premia calculated using data from 1984–2019) within area "Y", had a calculated size premium higher than the mean (i.e., average)

[1] The leftmost point in Area Y in Exhibit 4.16 is the CRSP Decile 10 size premium calculated using data from 1946–2019 (74 years); the rightmost point in Area Y in Exhibit 4.16 is the CRSP Decile 10 size premium calculated using data from 2000–2019 (20 years). The next calculation (2000–2018) has less than 20 years of data (19 years) and therefore falls into area "Z". Area "Z" results are excluded from any further analysis in this section because of the short time horizon over which they are calculated.

minus two standard deviations In other words, with the one exception noted, all the size premium observations calculated in area "Y" were in excess of the lower-bound 95% confidence interval (mean minus two standard deviations), with the indicated size premia always being positive (greater than 0 0%)

These analyses suggest

- The size effect is cyclical Sometimes small-cap companies outperform large-cap companies, and sometimes large-cap companies outperform small-cap companies [4.3]
- The longer the holding period over which small-cap companies and large-cap companies are given to "race" against each other, the more likely it is that small-cap companies will outperform large-cap companies [4.4]
- This implies that over the longer-term (which is the default period over which most business valuations are done), the size effect is indeed a significant factor that should likely be accounted for in the development of cost of capital estimates
- The 1980s were not kind to small capitalization stocks During this period, the size effect likely was on a cyclical low, or even significantly negative
- After the influence from the 1980s is in the rear-view mirror, small-cap companies seem to regain their footing, and the size effect seems to return to levels similar to those in the decades preceding the 1980s
- The evidence suggests that the size effect has diminished in strength in more recent years, especially when compared to the "early years" 1926–1945, during which small-cap companies outperformed large-cap companies by a large magnitude
- The size effect is still significant even *after* controlling for the huge small-cap outperformance of the "early years" 1926–1945

Relationship of Size and Liquidity

Liquidity affects the cost of capital For this purpose, *liquidity* refers to the speed at which a large quantity of a security can be traded with a minimal impact on the price and at the lowest cost Banz's 1981 musing as to whether " size per se is responsible for the effect or whether size is just a proxy for one or more true unknown factors correlated with size" may have been cannily prescient Research on returns as related to "size" is abundant, but over time a growing body of work investigating the impact of "liquidity" on returns has emerged

[4.3] See Roger Grabowski "The Size Effect - It Is Still Relevant" *Business Valuation Review* Volume 35 Number 2 Summer 2016

[4.4] Empirically estimation error of premiums goes down with the square root of time unlike beta or standard deviation estimation error which goes down by the square root of the number of observations Thus there can be long periods of negative results for positive premiums See also Fama Eugene F and French Kenneth R "Long Horizon returns (November 20 2016) Chicago Booth Research Paper No 17 17 Fama-Miller Working Paper Available at [illegible] and Fama Eugene F and French Kenneth R "Volatility Lessons (November 1 2017) Chicago Booth Research Paper No 17 33, Fama Miller Working Paper Available at [illegible]

Capital market theory also assumes liquidity of investments Many of the observations about risk and return are drawn from information for liquid investments Investors desire liquidity and require greater returns for illiquidity But the degree of liquidity is one of the risk factors for all investments Any discussion of a liquidity premium, therefore, would be incomplete without accounting for underlying stock risks before considering relative liquidity

Stocks of small companies generally do not have the same level of liquidity as large-company stocks This is likely a function of the mix of shareholders and underlying risk characteristics Many institutional investors do not own stocks in small companies because they have too much money to invest Were they to invest as little as 1% of their available funds in a small company, they would be likely to control the company Institutional investors generally want liquidity to move into and out of positions in a single firm Therefore, one does not see the breadth of investors investing in small-company stocks

Further, small companies are followed by only a small window of analysts, if at all This makes it more difficult for investors to evaluate small firms

Is the size premium simply the result of differences in liquidity? If one is valuing a small business, that business, if it were publicly traded, would likely never have the same breadth of shareholders as a large publicly traded company, and whatever impact the relative illiquidity of small companies has on the cost of capital will carry over to any small business

Some analysts have suggested that the size effect should be set aside because various studies have ignored transaction costs in measuring rates of return The analysts point out that small stocks often have higher transaction costs than large stocks In addition, the historical size premium can be greatly reduced if one makes certain assumptions about transaction costs and holding periods However, in applying the income approach to valuation, analysts typically use projected net cash flows that do not make any adjustment for an investor's hypothetical transaction costs It may be that small stocks are priced in a way that increases the rates of return so as to reward investors for the costs of executing a transaction If so, it would be a distortion to express the discount rate on a net-of-transaction-cost basis while the net cash flow projections are on a before-transaction-cost basis

Academic studies support the hypotheses that illiquidity is a factor in pricing and returns of stocks and that returns of small firms are more sensitive to market liquidity Moreover, any reasonable adjustment for transaction costs should recognize that investors can mitigate these costs on an annual basis by holding their stocks for a longer period In fact, investors in small companies tend to have longer holding periods than investors in large companies

First, let's examine some of the research

As early as 1986, Amihud and Mendelson, demonstrated that " market-observed average returns are an increasing function of the spread " (i e , less liquid stocks, as measured by a larger bid ask spread, outperform more liquid stocks), and further concluded that the " higher yields required on higher-spread stocks give firms an incentive to increase the liquidity of their securities, thus reducing their opportunity cost of capital" [4] [5]

In a 2013 article, Ibbotson, Chen, Kim, and Hu suggested that while the typical measures of liquidity employed in the literature are each " highly correlated with company size", they demonstrate that liquidity, as measured by annual stock turnover, " is an economically significant investment style that is just as strong, but distinct from traditional investment styles such as size, value/growth, and momentum" [1] [6] Analyzing the performance of a broad universe of U S stocks from 1972–2011, the authors go on to say that " there is an incremental return from investing in less liquid stocks even after adjusting for the market, size, value/growth, and momentum factors", and conclude that " equity liquidity is the missing equity style"

The authors identify two main sources of the greater returns of less liquid stocks The first is that "investors like liquidity and dislike illiquidity", and " a premium has to be paid for any characteristic that investors demand, and a discount must be given for any characteristic investors seek to avoid" Thus, " the investor in less liquid stocks gets lower valuations, effectively buying stocks at a discount"

As we discussed in Chapter 2, one can think of risk in terms of popularity For example, illiquidity is typically considered a risk, and less liquid stocks are considered less popular One can classify less liquid stocks as less popular than brand name stocks that are in the news, having more analyst coverage and greater trading volume Similarly, the size premium can be thought of as a risk measure that encompasses both illiquidity risk and underlying business risk, small capitalization stocks are typically less popular

In a 2018 update to the 2013 article, Ibbotson and Kim examine market data from 1972–2017 and conclude that liquidity, as measured by stock turnover, meets the four criteria that characterize a benchmark investment style that William F Sharpe defined in a 1992 article (i) "identifiable before the fact", (ii) "not easily beaten", (iii) "a viable alternative", and (iv) "low in cost" [2] [3] [7]

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[4] Amihud Yakov and Haim Mendelson 1986 "Asset Pricing and the Bid Ask Spread" *Journal of Financial Economics* 17 223–249

[5] See Roger G Ibbotson Zhiwu Chen Daniel Y J Kim and Wendy Y Hu "Liquidity as an Investment Style", *Financial Analysts Journal* Vol 69(3) 30–44 May/June 2013 Copy available at

[6] The 2018 update to the 2013 article is Roger G Ibbotson and Daniel Y J Kim "Liquidity as an Investment Style" 2018 Update February 13 2018 The section on the 2018 update herein is largely excerpted from Roger G Ibbotson and Daniel Y J Kim's writing in same Copies of the 2018 update are available at Roger Ibbotson is Professor Emeritus of Finance Yale School of Management and Chairman Zebra Capital Management LLC Daniel Y J Kim is Director of Research Zebra Capital Management, LLC

[7] Sharpe William F 1992 "Asset Allocation Management Style and Performance Measurement" *Journal of Portfolio Management* Vol 18 No 2 (Winter) 7–19

Identifiable Before the Fact: Given that Ibbotson and Kim's measure of liquidity was the previous year's turnover of the stock, the liquidity measure used is (by definition) *"identifiable before the fact"*[1]

Not Easily Beaten: Ibbotson and Kim then compared the 1st quartile returns of the various styles, and these all outperformed the equally weighted market portfolio. The returns from the low liquidity quartile were comparable to the other styles, beating size and momentum, but trailing value. They consider all four styles to be *"not easily beaten"*

A Viable Alternative: Ibbotson and Kim examined double sort portfolios comparing liquidity with size, value, and momentum in four-by-four matrices. The impact of liquidity on returns was somewhat stronger than size and momentum, and roughly comparable to value. It was also additive to each style. Thus they determined that liquidity was *"a viable alternative"* to size, value, and momentum.

Low in Cost: Ibbotson and Kim demonstrated that less liquid portfolios could be formed *"at low cost"*. The portfolios they examined were formed only once per year, and 64.27% of the stocks stayed in the same quartile. The high-performing low quartile had 78.55% of the stocks stay in that quartile. Thus the liquidity portfolios themselves exhibit low turnover, which can keep their costs low.

Ibbotson and Kim demonstrate that liquidity is "a viable alternative" to each of the three other well established styles (size, value/growth, and momentum) by focusing on distinguishing turnover from size, value, and momentum by constructing "double-sort" quartile portfolios that combine liquidity with each of the other styles (in turn). In each of these analyses, the "liquidity effect" held regardless of size, value/growth, and momentum groupings.

For example, it is often presumed that investing in less liquid stocks is equivalent to investing in small-cap stocks. To determine if liquidity is effectively a proxy for size, they constructed equally weighted double-sort portfolios in capitalization and turnover quartiles. Exhibit 4.17 reports the annualized geometric mean (compound) return, arithmetic mean return, and standard deviation of returns along with the average number of stocks in each intersection portfolio.

[1] Other liquidity measures could have met that criteria as well, but Ibbotson and Kim chose turnover because it was simple, easy to measure, and has a significant impact on returns.

Exhibit 4.17: Summary Statistics of Size and Liquidity "Double Sort" Quartile Portfolios 1972–2019

	Low Liquidity	Mid-Low Liquidity	Mid-High Liquidity	High Liquidity	Liquidity Effect (%)
Micro-Cap					
Geometric Mean (%)	15 44	15 28	9 42	-0 65	**16.09**
Arithmetic Mean (%)	17 74	18 79	14 47	4.39	
Standard Deviation (%)	22 54	28 36	34 05	32 81	
Avg Number of Stocks	348	181	122	96	
Small-Cap					
Geometric Mean (%)	15 25	14 22	11 91	5 69	**9.56**
Arithmetic Mean (%)	16 85	16 67	15 10	9 70	
Standard Deviation (%)	19 19	23 43	26 57	29 72	
Avg Number of Stocks	198	201	173	175	
Mid-Cap					
Geometric Mean (%)	13 68	13 65	12 74	8 14	**5.54**
Arithmetic Mean (%)	15 01	15 31	14 80	11 56	
Standard Deviation (%)	17 50	19 51	21 35	27 09	
Avg Number of Stocks	128	177	204	240	
Large-Cap					
Geometric Mean (%)	11 43	12 33	11 84	8 95	**2.48**
Arithmetic Mean (%)	12 64	13 45	13 35	11 81	
Standard Deviation (%)	16 17	15 46	17 74	24 31	
Avg Number of Stocks	73	188	249	237	
Size Effect (%)	**4.01**	**2.95**	**-2.42**	**-9.60**	

Source: Compound annual returns (%) from 1972–2019 Calculated by Zebra Capital Management at [illegible] This is an update to the research published in Ibbotson Roger G and Daniel Y -J Kim "Liquidity as an Investment Style" 2018 Update available at [illegible] Updated version of Ibbotson Roger G Chen Zhiwu Kim Daniel Y -J and Hu Wendy Y "Liquidity as an Investment Style" *Financial Analysts Journal* May/June 2013 updated with 2013–2017 data

Across the micro-cap quartile in Exhibit 4 17, the low-liquidity portfolio earned a geometric mean return of 15 44% per year in contrast to the high-liquidity portfolio returning −0 65 per year, suggesting that the liquidity effect is the *strongest* (16 09%) among micro-cap stocks, and then declines from small- to mid- to large-cap stocks Note that the micro-caps row contains both the *highest* return and the *lowest* returns

Across the large-cap quartile, the low- and high-liquidity portfolios returned 11 43% and 8 95% respectively, producing a liquidity effect of 2 48%

Within the two mid-size portfolios, the liquidity return spread is also significant Therefore, size does not capture liquidity (i e , the liquidity premium *holds* regardless of size group) Conversely,

the size effect does *not* hold across all liquidity quartiles, especially in the highest turnover quartile (-9 60%)

A "heat map" of the size and liquidity "double sort" quartile portfolios is presented in Exhibit 4 18. In Exhibit 4 18, the deeper the red, the *higher* the return, and the darker the gray, the *lower* the return For example, the *highest* return over the 1972–2019 period was produced by low-liquidity/micro-cap stocks (15 44%) Alternatively, the *lowest* return was produced by high-liquidity/micro-cap stocks (- 65%)

Exhibit 4.18: Heat Map of Size and Liquidity "Double Sort" Quartile Portfolios (%), Compound Annual Returns
1972–2019

Low Liquidity ⟶ High Liquidity

Micro-Cap ↓ Large-Cap				
	15.44	15.28	9.42	-0.65
	15.25	14.22	11.91	6.69
	13.68	13.65	12.74	8.14
	11 43	12 33	11 84	8.95

Source: Compound annual returns (%) from 1972- 2019 Calculated by Zebra Capital Management at [illegible] This is an update to the research published in Ibbotson Roger G , and Daniel Y -J Kim "Liquidity as an Investment Style 2018 Update," available at [illegible] Updated version of Ibbotson Roger G Chen Zhiwu Kim Daniel Y - J and Hu, Wendy Y "Liquidity as an Investment Style" *Financial Analysts Journal* May/ June 2013, updated with 2013- 2017 data

In the 2018 update on liquidity, Ibbotson and Kim reach four broad conclusions (i) liquidity should be given equal standing to size, value/growth, and momentum as an investment style, (ii) liquidity, as measured by stock turnover, is an economically significant indicator of long run returns, (iii) returns from liquidity are sufficiently different from the other styles, so that it is not merely a substitute, and finally, (iv) a stock's liquidity is relatively stable over time, with changes in liquidity associated with changes in valuation

Ashok Abbott also investigated the relative importance of the size and liquidity risk factors [4.30] The author used a multi-factor model including a trading cost measure and a liquidity premium factor to assess the absolute contribution for each factor individually, as well as in combination with

[4.30] Ashok Bhardwaj Abbott (2015) Available from the author

[4.31] A measure of an individual stock's liquidity with higher levels signifying that the current order flow in the market can absorb larger volumes of trading without significantly affecting prices

other factors, to form an estimate of the combined contribution of the factors considered in the estimate of the cost of equity capital."

Abbott found significant negative relationships between the size of the companies as measured by market value of equity and his trading cost measure, stocks of larger firms can be traded at a lower cost. He found a similar relationship between liquidity and cost of trading. As stocks become more liquid, trading costs and price impact both decline, as suggested by theory.

The Risk Premium Report Study demonstrates that size and fundamental risk of small companies are correlated (discussed in chapter 10). This leads one to consider that size may, in part at best, be a coincident indicator of fundamental company risk.

That same relationship may be creating the liquidity effect. That is, the underlying risks of small companies being greater than those of larger companies may cause investors to shy away from small companies, valuing their liquidity. Thus, reduced liquidity may also be a coincident indicator of fundamental risk.

In measuring the appropriate size premium when estimating the cost of equity capital for a division or reporting unit of a large public company or a closely held business, one need not separate the portion of the size premium that may be attributable to an illiquidity factor. One is estimating the cost of capital as if the market were pricing the risks of the subject business based on the average risk of other companies of comparable size including any portion of the risks due to illiquidity.

Conclusion

The results confirm that liquidity impacts returns across styles and locations. Investing in less liquid securities generates higher returns. Liquidity seems to be an investment style that is different from size or value. This result seems to hold up in almost any equity market subset and in any location.

This section is an excerpt from a new Chartered Financial Analyst® (CFA) Institute Research Foundation monograph entitled, "Popularity: A Bridge Between Classical and Behavioral Finance" by Roger G. Ibbotson and colleagues Thomas M. Idzorek, CFA, Paul D. Kaplan, CFA, and James X. Xiong, CFA.[2][3]

[1] A measure of an individual stock's liquidity with higher levels signifying that the current order flow in the market can absorb larger volumes of trading without significantly affecting prices.

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Available for download at
http[illegible] or go to the CFA website at cfainstitute.org and search for "popularity."

[3] Ibbotson, R.G., Idzorek, T.M., "Dimensions of Popularity," Journal of Portfolio Management, Vol. 40, No. 5, (Special 40th Anniversary Issue 2014), P. 68–74.

What's Next?

For many years, academics have sought to explain and understand asset prices, with a strong emphasis on market premiums and market anomalies. These premiums and anomalies can be explained by social or behavioral phenomenon in many settings. In a 2014 article, Roger Ibbotson and Tom Idzorek said, "Most of the best-known market premiums and anomalies can be explained by an intuitive and naturally occurring (social or behavioral) phenomenon observed in countless settings: popularity."[4,14]

Popularity

The existence of various market premiums and anomalies is well established in the finance literature. To date, however, no single agreed-upon explanation for them has emerged. Investment finance is largely divided into two camps, classical and behavioral. Classical finance is based mainly on the idea that investors are risk averse, so market premiums are generally interpreted as risk premiums. In behavioral finance, premiums are considered to be the result of either cognitive errors that investors systematically make or preferences for company or security characteristics that might not be related to risks. We believe that most of the best-known market premiums and anomalies can be explained by an intuitive and naturally occurring (social or behavioral) phenomenon observed in countless settings: popularity.

What Is Popularity?

Popularity is the condition of being admired, sought after, well-known, and/or accepted. A wide range of possible categories – people, food, fashion, music, places to live, types of pet, vacation destinations, television shows, and so on – contain an implicit popularity spectrum or rank. Each of the categories has various criteria for estimating popularity.

For our purposes, the quality of the ranking criteria is not important; what is important is that any given category comprises a natural ordering in which some constituents are more popular than others. Such relative popularity evolves over time. Some aspects of popularity are systematic, or more or less permanent (for example, modern society seems to prefer thin to fat, tall to short). Other aspects of popularity may be transitory or exist only as fads (for example, necktie width, high-waisted jeans, men wearing wigs). Whether the result of systematic trends or idiosyncratic evolution, these rankings are in flux. Some popular items become relatively less popular, and some of the unpopular items become relatively more popular. While unsustainable, some popular items will temporarily become even more popular. For example, liquidity is permanently popular, but on a relative basis during times of market distress, it is especially sought after. Society places a greater relative value (monetary or otherwise) on the more popular items.

[4] Ibbotson, R.G., Idzorek, T.M. "Dimensions of Popularity." Journal of Portfolio Management. Vol. 40 No. 5 (Special 40th Anniversary Issue 2014) P. 68 - 74.

In *Popularity: A Bridge Between Classical and Behavioral Finance*, popularity refers to investor preferences – that is, how much an asset is liked or disliked. Of course, the primary preference for investors is to seek returns. Investors do not know what the returns will be, but they can distinguish one asset from another in terms of their observable characteristics, for which they may have clearly defined preferences. Thus, even with the same set of expected cash flows, investors may have more demand for one asset over another, which gives the preferred asset a higher current price and a lower expected return. An asset could be liked (or disliked) for *rational* or *irrational* reasons.[1] In this way, popularity spans ideas from both classical and behavioral finance, thus providing a bridge between the two camps.

In classical finance, the primary preference, beyond maximizing expected return, is to take less risk. This fact has given rise to various models that usually assume no other preferences. In the most well-known model, the capital asset pricing model (CAPM), the only "priced" characteristic is exposure to undiversifiable market risk. We consider a broader set of preferences that lead to other priced characteristics, which might include the rational preferences to reduce catastrophic losses, increase liquidity, be tax efficient, and so on. We also consider preferences that might be more in line with what the literature considers "behavioral," such as desiring to hold companies with strong brands, investments with strong past price increases, or companies that have strong ESG (environmental, social, and governance) characteristics.

The popularity framework presented in *Popularity: A Bridge Between Classical and Behavioral Finance* includes a generalization of a wide range of characteristics in classical finance and behavioral finance that influence how investors value securities. We can classify these characteristics into two broad categories with two subcategories each as follows:

Classical

- **Risks.** In classical finance, risk usually refers to fluctuations in asset values, but risk can be interpreted more broadly as any risks to which a rational investor, who assumes away any real-world frictions in the holding and trading of securities, would be averse. Thus, risks may be multidimensional, including various types of stock or bond risks, or may arise from catastrophic events.

- **Frictional.** These characteristics are often assumed away in classical finance, but a rational investor would consider them. Examples include taxes, trading costs, and asset divisibility.

[1] Throughout *Popularity: A Bridge Between Classical and Behavioral Finance* we describe preferences or the reasons for preferences as being either rational or irrational. Rational reasons for preferences are those considered in classical finance broadly defined. The reasons include expected returns, risk, liquidity, taxes, and trading costs. Generally, rational preferences are pecuniary. Irrational reasons for preferences generally are those identified in behavioral finance and result from the various biases and heuristics identified in that literature. Irrational preferences are generally nonpecuniary. Although Ibbotson, Diermeier, and Siegel (1984) acknowledged the possibility of nonpecuniary security characteristics playing a role in asset pricing (such as in the art market), their focus was on pecuniary characteristics that we consider to be subject to rational preferences. Our popularity framework extends their idea to irrational preferences.

Behavioral

- **Psychological.** Investors consider these characteristics because of their psychological impact. For example, buying a company with a small carbon footprint might make an investor feel good.

- **Cognitive.** Investors consider these factors or fail to accurately interpret such factors because of systematic cognitive errors. For example, investors may overvalue the importance of a company's brand when evaluating its stock because they do not realize that the value of the brand is already embedded in the market price of the stock.

Our fourfold classification of security characteristics partially overlaps with the threefold classification in Statman (2017), in which investors are described as holding securities for utilitarian, expressive, and emotional rea-sons. Utilitarian reasons correspond to risk and frictional characteristics, and expressive In and emotional reasons correspond to psychological characteristics.

In *Popularity: A Bridge Between Classical and Behavioral Finance*, we focus primarily on the stock market, although we believe the concepts can be applied to fixed-income securities, real estate, and numerous other real assets. Periodically, as necessary, we attempt to distinguish between characteristics of a company and characteristics of the security in question – both of which can have attributes that are more or less popular among investors. Assets are priced not only by their expected cash flows but also by the popularity of the other characteristics associated with the company or security. The less popular stocks have lower prices (relative to the expected discounted value of their cash flows), thus higher expected returns. Popularity can be related to risk (an unpopular characteristic), and it can also be related to other rational preferences. But popularity can also be related to behavioral concepts. For instance, investors may want to brag about their past winners (or purchase recent winners – for example, in the practice called "window dressing") or hold recognizable securities that are consistent with their social values. Any aspect that can affect the popularity of a stock will affect its demand and thus its price.[1]

Popularity is a bridge between classical finance and behavioral finance because both types of finance rely on preferences. Popularity is an expression of these preferences, whether they are rational, irrational, or somewhere in between.[2] Popularity does not make a value judgment but, instead, takes pref-erences as a given and recognizes that preferences can change over time. *Popularity: A Bridge Between Classical and Behavioral Finance* is presented in an equilibrium framework, so asset prices and expected returns reflect the aggregate impact of investor preferences.

[1] By demand, we mean the sum of the demand of all market participants.

[2] The same preference may be rational for one investor and irrational for another investor. For example, it is rational for a taxable investor to consider tax efficiency and irrational for nontaxable investor to seek out tax efficient investments.

Key Things to Remember about the Size Premium

- The size effect is based on the empirical observation that companies of smaller size are associated with greater risk and, therefore, have greater costs of capital. In other words, there is a significant (negative) relationship between the size and historical equity returns – as size *decreases*, returns tend to *increase*, and vice versa.

- Traditionally, small companies are believed to have greater required rates of return than large companies because small companies are inherently riskier. It is not clear, however, whether this is due to size itself, or to another factor closely related to size.

- The size effect is not evident just for the smallest companies, it is evident for all but the largest groups of companies, including companies with a market capitalization in excess of several billions of dollars. However, the size effect is greatest with the smallest companies.

- Small-cap companies tend to outperform large-cap companies over longer periods. The longer the period over which small-cap companies and large-cap companies are given to "race" against each other, the more likely it is that small cap companies will outperform large-cap companies. The size effect tends to stabilize over time.

- Use sum betas for the development of size premia, and use sum beta within the CAPM (particularly if dealing with very small companies), because sum betas tend to better explain the returns of smaller companies. However, in cases in which you do use OLS betas in CAPM, you should use an OLS-beta derived size premium.

- Risk Premium Report portfolios do not include start-up and high-financial-risk companies. The returns on these companies could be expected to be high because of their risk, not because of their size.

- Despite many criticisms of the size effect, it continues to be observed in data sources. Further, observation of the size effect is consistent with a modification of the pure CAPM. Studies have shown the limitations of beta as a sole measure of risk. The size premium is an empirically derived correction to the pure CAPM.

- The 1980s were not kind to small capitalization stocks. During this period, the size effect likely was on a cyclical low, or even significantly negative.

- After the influence from the 1980s is in the rear-view mirror, small-cap companies seem to regain their footing, and the size effect seems to return to levels similar to those in the decades preceding the 1980s.

- The evidence suggests that the size effect has diminished in strength in more recent years, especially when compared to the "early years" 1926–1945, during which small-cap companies outperformed large-cap companies by a large degree.

- The size effect is still significant even after controlling for the huge small-cap outperformance of the "early years" 1926–1945

- If the valuation analyst is estimating the cost of equity capital of a closely held subject company on an "as if publicly" basis, the valuation assumption is that the subject company would have liquidity (if it was public) to approximately the average of comparable size public companies. The size premium in the Cost of Capital Navigator are appropriate to use in developing the cost of equity capital without separating the size effect from the liquidity effect.

- The size effect is not without controversy, nor is this controversy something new. Traditionally, small companies are believed to have greater required rates of return than large companies because small companies are inherently riskier. It is not clear, however, whether this is due to size itself, or to other factors closely related to or correlated with size (e.g., liquidity).

- One can think of risk in terms of popularity. Characteristics of investments that investors *desire* are "popular", while characteristics of investments that investors do *not* desire are not popular. All other things being equal, assets with popular characteristics will be priced higher and have lower returns than assets with unpopular characteristics, which will be priced lower and have higher returns. Popularity can include all sorts of other characteristics that do not fit well into the risk and return paradigm.

- Most recently (2019), Ibbotson and colleagues Thomas M. Idzorek, CFA, Paul D. Kaplan, CFA, and James X. Xiong, CFA published a new Chartered Financial Analyst® (CFA) Institute Research Foundation monograph entitled, *Popularity: A Bridge Between Classical and Behavioral Finance* (available for download at https://www.cfainstitute.org/en/research/foundation/2018/popularity-bridge-between-classical-and-behavioral-finance).[1]

[1] Or go to the CFA website at www.cfainstitute.org and search for "popularity".

FIFTH EDITION

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9 Capital Budgeting and Risk

Long before the development of modern theories linking risk and expected return, smart financial managers adjusted for risk in capital budgeting. They realized intuitively that, other things being equal, risky projects are less desirable than safe ones. Therefore financial managers demanded a higher rate of return from risky projects, or they based their decisions on conservative estimates of the cash flows.

Various rules of thumb are often used to make these risk adjustments. For example, many companies estimate the rate of return required by investors in their securities and use the **company cost of capital** to discount the cash flows on all new projects. Since investors require a higher rate of return from a very risky company, such a firm will have a higher company cost of capital and will set a higher discount rate for its new investment opportunities. For example, in Table 8-1 we estimated that investors expected a rate of return of .163 or about 16.5 percent from Microsoft common stock. Therefore, according to the company cost of capital rule, Microsoft should have been using a 16.5 percent discount rate to compute project net present values.[1]

This is a step in the right direction. Even though we can't measure risk or the expected return on risky securities with absolute precision, it is still reasonable to assert that Microsoft faced more risk than the average firm and, therefore, should have demanded a higher rate of return from its capital investments.

But the company cost of capital rule can also get a firm into trouble if the new projects are more or less risky than its existing business. Each project should be evaluated at its *own* opportunity cost of capital. This is a clear implication of the value-additivity principle introduced in Chapter 7. For a firm composed of assets A and B, the firm value is

$$\text{Firm value} = PV(AB) = PV(A) + PV(B) = \text{sum of separate asset values}$$

Here PV(A) and PV(B) are valued just as if they were mini-firms in which stockholders could invest directly. Investors would value A by discounting its forecasted cash flows at a rate reflecting the risk of A. They would value B by discounting at a rate reflecting the risk of B. The two discount rates will, in general, be different.

[1]Microsoft did not use any significant amount of debt financing. Thus its cost of capital is the rate of return investors expect on its common stock. The complications caused by debt are discussed later in this chapter.

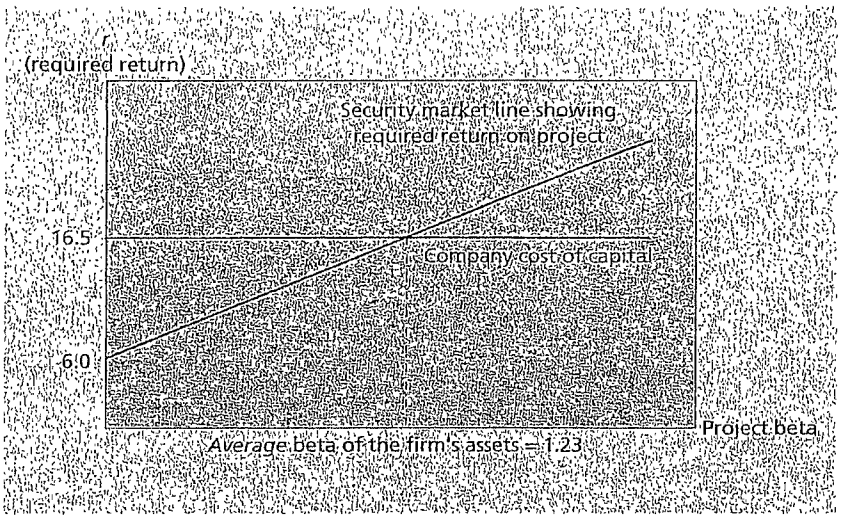

Figure 9-1 A comparison between the company cost of capital rule and the required return under the capital asset pricing model. Microsoft's company cost of capital is about 16.5 percent. This is the correct discount rate only if the project beta is 1.23. In general, the correct discount rate increases as project beta increases. Microsoft should accept projects with rates of return above the security market line relating required return to beta.

If the firm considers investing in a third project C, it should also value C as if C were a mini-firm. That is, the firm should discount the cash flows of C at the expected rate of return that investors would demand to make a separate investment in C. *The true cost of capital depends on the use to which the capital is put.*

This means that Microsoft should accept any project that more than compensates for the *project's beta*. In other words, Microsoft should accept any project lying above the upward-sloping line that links expected return to risk in Figure 9-1. If the project has a high risk, Microsoft needs a higher prospective return than if the project has a low risk. Now contrast this with the company cost of capital rule, which is to accept any project *regardless of its risk* as long as it offers a higher return than the *company's* cost of capital. In terms of Figure 9-1, the rule tells Microsoft to accept any project above the horizontal cost-of-capital line, i.e., any project offering a return of more than 16.5 percent.

It is clearly silly to suggest that Microsoft should demand the same rate of return from a very safe project as from a very risky one. If Microsoft used the company cost of capital rule, it would reject many good low-risk projects and accept many poor high-risk projects. It is also silly to suggest that just because Duke Power has a low company cost of capital, it is justified in accepting projects that Microsoft would reject. If you followed such a rule to its seemingly logical conclusion, you would think it possible to enlarge the company's investment opportunities by investing a large sum in Treasury bills. That would make the common stock safe and create a low company cost of capital.[2]

The notion that each company has some individual discount rate or cost of capital is widespread, but far from universal. Many firms require different returns from different categories of investment. For example, discount rates might be set as follows:

[2]If the present value of an asset depended on the identity of the company that bought it, present values would not add up. Remember, a good project is a good project is a good project.

Category	Discount Rate
Speculative ventures	30%
New products	20%
Expansion of existing business	15% (company cost of capital)
Cost improvement, known technology	10%

The capital asset pricing model is widely used by large corporations to estimate the discount rate. It states

$$\text{Expected project return} = r = r_f + (\text{project beta})(r_m - r_f)$$

To calculate this, you have to figure out the project beta. Before thinking about the betas of individual projects, we will look at some problems you would encounter in using beta to estimate a company's cost of capital. It turns out that beta is difficult to measure accurately for an individual firm: Much greater accuracy can be achieved by looking at an average of similar companies. But then we have to define *similar*. Among other things, we will find that a firm's borrowing policy affects its stock beta. It would be misleading, e.g., to average the betas of Chrysler, which has been a heavy borrower, and General Motors, which has generally borrowed less.

The company cost of capital is the correct discount rate for projects that have the same risk as the company's existing business but *not* for those projects that are safer or riskier than the company's average. The problem is to judge the relative risks of the projects available to the firm. To handle that problem, we will need to dig a little deeper and look at what features make some investments riskier than others. After you know *why* AT&T stock has less market risk than, say, Ford Motor, you will be in a better position to judge the relative risks of capital investment opportunities.

There is still another complication: Project betas can shift over time. Some projects are safer in youth than in old age; others are riskier. In this case, what do we mean by *the* project beta? There may be a separate beta for each year of the project's life. To put it another way, can we jump from the capital asset pricing model, which looks out one period into the future, to the discounted-cash-flow formula that we developed in Chapters 2 and 6 for valuing long-lived assets? Most of the time it is safe to do so, but you should be able to recognize and deal with the exceptions.

We will use the capital asset pricing model, or CAPM, throughout this chapter. But don't infer that the CAPM is the last word on risk and return. The principles and procedures covered in this chapter work just as well with other models such as arbitrage pricing theory (APT). For example, we could have started with an APT estimate of the expected rate of return on Microsoft stock; the discussion of company and project costs of capital would have followed exactly.

9-1 MEASURING BETAS

Suppose that you were considering an across-the-board expansion by your firm. Such an investment would have about the same degree of risk as the existing business. Therefore you should discount the projected flows at the company cost of capital. To estimate that, you could begin by estimating the beta of the company's stock.

An obvious way to measure the beta of the stock is to look at how its price has responded in the past to market movements. For example, in Figure 9-2*a* and *b* we have plotted monthly rates of return from AT&T and Hewlett-Packard against mar-

Thus we could view the project as offering an expected payoff of .5(1500) + .5(0) = 750, or $750,000, at $t = 1$ on a $125,000 investment at $t = 0$. Of course, the certainty equivalent of the payoff is less than $750,000, but the difference would have to be very large to justify rejecting the project. For example, if the certainty equivalent is half the forecasted cash flow and the risk-free rate is 7 percent, the project is worth $225,500:

$$\text{NPV} = C_0 + \frac{\text{CEQ}_1}{1 + r_f}$$
$$= -125 + \frac{.5(750)}{1.07} = 225.5, \text{ or } \$225{,}500$$

This is not bad for a $125,000 investment—and quite a change from the negative NPV that management got by discounting all future cash flows at 25 percent.

A Common Mistake

You sometimes hear people say that because distant cash flows are "riskier," they should be discounted at a higher rate than earlier cash flows. That is quite wrong: Using the same risk-adjusted discount rate for each year's cash flow implies a larger deduction for risk from the later cash flows. The reason is that the discount rate compensates for the risk borne *per period.* The more distant the cash flows, the greater the number of periods and the larger the *total* risk adjustment.

It makes sense to use a single risk-adjusted discount rate as long as the project has the same market risk at each point in its life. But look out for exceptions like the electric mop project, where market risk changes as time passes.

9-6 SUMMARY

In Chapter 8 we set out some basic principles for valuing risky assets. In this chapter we have shown you how to apply these principles to practical situations.

The problem is easiest when you believe that the project has the same market risk as the company's existing assets. In this case, the required return equals the required return on a portfolio of the company's securities. This is called the *company cost of capital.*

Capital asset pricing theory states that the required return on any asset depends on its risk. In this chapter we have defined risk as beta and used the capital asset pricing model to calculate expected returns.

The most common way to estimate the beta of a stock is to figure out how the stock price has responded to market changes in the past. Of course, this will give you only an estimate of the stock's true beta. You may get a more reliable figure if you calculate an industry beta for a group of similar companies.

Suppose that you now have an estimate of the stock's beta. Can you plug that into the capital asset pricing model to find the company's cost of capital? No, the stock beta may reflect both business and financial risk. Whenever a company borrows money, it increases the beta (and the expected return) of its stock. Remember, the company cost of capital is the expected return on a portfolio of all the firm's securities, not just the common stock. You can calculate it by estimating the expected return on each of the securities and then taking a weighted average of these separate returns. Or you can calculate the beta of the portfolio of securities and then plug this *asset beta* into the capital asset pricing model.

The company cost of capital is the correct discount rate for projects that have the same risk as the company's existing business. Many firms, however, use the company cost of capital to discount the forecasted cash flows on all new projects. This is a dangerous procedure. In principle, each project should be evaluated at its own opportunity cost of capital; the true cost of capital depends on the use to which the capital is put. If we wish to estimate the cost of capital for a particular project, it is *project risk* that counts. Of course the company cost of capital is fine as a discount rate for average-risk projects. It is also a useful starting point for estimating discount rates for safer or riskier projects.

We cannot give you a neat formula that will allow you to estimate project betas, but we can give you some clues. First, avoid adding fudge factors to discount rates to offset worries about bad project outcomes. Adjust cash-flow forecasts to give due weight to bad outcomes as well as good; *then* ask whether the chance of bad outcomes adds to the project's market risk. Second, you can often identify the characteristics of a high- or low-beta project even when the project beta cannot be calculated directly. For example, you can try to figure out how much the cash flows are affected by the overall performance of the economy: Cyclical investments are generally high-beta investments. You can also look at the project's operating leverage: Fixed production charges work like fixed debt charges; i.e., they increase beta.

There is one more fence to jump. Most projects produce cash flows for several years. Firms generally use the same risk-adjusted rate r to discount each of these cash flows. When they do this, they are implicitly assuming that cumulative risk increases at a constant rate as you look further into the future. That assumption is usually reasonable. It is precisely true when the project's future beta will be constant, i.e., when risk *per period* is constant.

But exceptions sometimes prove the rule. Be on the alert for projects where risk clearly does *not* increase steadily. In these cases, you should break the project into segments within which the same discount rate can be reasonably used. Or you should use the certainty-equivalent version of the DCF model, which allows separate risk adjustments to each period's cash flow.

APPENDIX: USING THE CAPITAL ASSET PRICING MODEL TO CALCULATE CERTAINTY EQUIVALENTS

When calculating present value, you can take account of risk in either of two ways. You can discount the expected cash flow C_1 by the risk-adjusted discount rate r:

$$PV = \frac{C_1}{1 + r}$$

Alternatively, you can discount the certainty-equivalent cash flow CEQ_1 by the risk-free rate of interest r_f:

$$PV = \frac{CEQ_1}{1 + r_f}$$

In this appendix we show how you can derive CEQ_1 from the capital asset pricing model.

We know from our present value formula that $1 + r$ equals the expected dollar payoff on the asset divided by its present value:

Fundamentals of Financial Management

Fifth Edition

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traded, then we cannot calculate the firm's beta. For the privately owned firm, we might use the so-called "pure play" CAPM technique This involves finding a firm in the same line of business that does have public equity, estimating its beta, and then using this beta as a proxy for that of the small business in question

To illustrate the pure play approach, again consider BTG The firm is not publicly traded, so we cannot estimate its beta. However, data are available on more established firms, such as Genentech and Genetic Industries, so we could use their betas as representative of the biological and genetic engineering industry Of course, these firms' betas would have to be subjectively modified to reflect their larger sizes and more established positions, as well as to take account of the differences in the nature of their products and their capital structures as compared to those of BTG. Still, as long as there are public companies in similar lines of business available for comparison, the estimates of their betas can be used to help estimate the cost of capital of a firm whose equity is not publicly traded Note that a "liquidity premium" as discussed in Chapter 3 would also have to be added to reflect the illiquidity of the small, nonpublic firm's stock.

Flotation Costs for Small Issues

When external equity capital is raised, flotation costs increase the cost of equity capital beyond what it would be for internal funds. These external flotation costs are especially significant for smaller firms, and they can substantially affect capital budgeting decisions involving external equity funds. To illustrate this point, consider a firm that is expected to pay constant dividends forever, and hence whose growth rate is zero. In this case, if F is the percentage flotation cost, then the cost of equity capital is $k_e = D_1/[P_0(1 - F)]$ The higher the flotation cost, the higher the cost of external equity.

How big is F? According to the latest Securities and Exchange Commission data, the average flotation cost of large common stock offerings (more than $50 million) is only about 4 percent. For a firm that is expected to provide a 15 percent dividend yield (that is, $D_1/P_0 = 15\%$), the cost of equity is 15%/(1 − 0.04), or 15.6 percent However, the SEC's data on small stock offerings (less than $1 million) show that flotation costs for such issues average about 21 percent. Thus, the cost of equity capital in the preceding example would be 15%/(1 − 0.21), or about 19 percent. When we compare this to the 15.6 percent for large offerings, it is clear that a small firm would have to earn considerably more on the same project than a large firm. Small firms are therefore at a substantial disadvantage because of the effects of flotation costs.

The Small-Firm Effect

A number of researchers have observed that portfolios of small-firm stocks have earned consistently higher average returns than those of large-firm stocks; this is called the "small-firm effect." On the surface, it would seem to be advantageous to the small firm to provide average returns in the stock market that are higher than those of large firms. In reality, it is bad news for the small firm; what the small-firm effect means is that the capital market demands higher returns on stocks of small firms than on otherwise similar stocks of large firms. Therefore, the cost of equity capital is higher for small firms. This compounds the high flotation cost problem noted above.

It may be argued that stocks of small firms are riskier than those of large ones and that this accounts for the differences in returns. It is true that academic research usually finds that betas are higher on average for small firms than for large ones. However, the larger returns for small firms remain larger even after adjusting for the effects of their higher risks as reflected in their beta coefficients.

The small-firm effect is an anomaly in the sense that it is not consistent with the CAPM theory. Still, higher returns reflect a higher cost of capital, so we must conclude that smaller firms do have higher capital costs than otherwise similar larger firms. The manager of a small firm should take this factor into account when estimating his or her firm's cost of equity capital. In general, the cost of equity capital appears to be about four percentage points higher for small firms (those with market values of less than $20 million) than for large, New York Stock Exchange firms with similar risk characteristics.

Allete, Inc. (ALE)

(Real Time Quote from BATS)

$58.73 USD

-0.81 (-1.36%)

Updated Jul 31, 2020 03:06 PM ET

Zacks Rank:

4-Sell

Style Scores:

C Value | C Growth | C Momentum | C VGM

Industry Rank:

Bottom 33% (169 out of 253)
Industry: Utility - Electric Power

Detailed Estimates

Estimates	
Next Report Date	*BMO 8/5/20
Current Quarter	0.65
EPS Last Quarter	1.28
Last EPS Surprise	4.07%
ABR	3.00
Earnings ESP	0.00%
Current Year	3.36
Next Year	3.73
EPS (TTM)	3.46
P/E (F1)	17.80

*BMO = Before Market Open *AMC = After Market Close

Growth Estimates	ALE	IND	S&P
Current Qtr (06/2020)	-1.52	57.51	-50.17
Next Qtr (09/2020)	0.00	18.80	-24.64
Current Year (12/2020)	-6.41	-3.10	NA
Next Year (12/2021)	11.01	10.00	26.34
Past 5 Years	0.90	5.80	NA
Next 5 Years	NA	7.30	NA
PE	17.80	18.20	24.35
PEG Ratio	NA	2.49	NA

See Brokerage Recommendations

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Premium Research for ALE

Zacks Rank	**Sell 4**
Zacks Industry Rank	Bottom 33% (169 out of 253)
Zacks Sector Rank	Bottom 31% (11 out of 16)
Style Scores	**C Value | C Growth | C Momentum | C VGM**
Earnings ESP	0.00%
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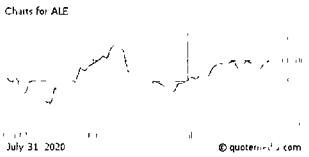


Interactive Chart | Fundamental Charts

Sales Estimates

	Current Qtr (6/2020)	Next Qtr (9/2020)	Current Year (12/2020)	Next Year (12/2021)
Zacks Consensus Estimate	295 50M	293 86M	1 20B	1 24B
# of Estimates	1	1	1	1
High Estimate	295 50M	293 86M	1 20B	1 24B
Low Estimate	295 50M	293 86M	1 20B	1 24B
Year ago Sales	290 40M	288.30M	1 24B	1 20B
Year over Year Growth Est	1 76%	1 93%	-3 11%	3 28%

Earnings Estimates

	Current Qtr (6/2020)	Next Qtr (9/2020)	Current Year (12/2020)	Next Year (12/2021)
Zacks Consensus Estimate	0 65	0 60	3 36	3 73
# of Estimates	1	1	1	1

Most Recent Consensus	Current Qtr (6/2020)	Next Qtr (9/2020)	Current Year (12/2020)	Next Year (12/2021)
High Estimate	0 65	0 60	3 36	3 73
Low Estimate	0 65	0 60	3 36	3 73
Year ago EPS	0 66	0 60	3 59	3 36
Year over Year Growth Est	-1 52%	0 00%	-6 41%	11 01%

Agreement - Estimate Revisions

	Current Qtr (6/2020)	Next Qtr (9/2020)	Current Year (12/2020)	Next Year (12/2021)
Up Last 7 Days	0	0	0	0
Up Last 30 Days	0	0	0	0
Up Last 60 Days	0	0	0	0
Down Last 7 Days	0	0	0	0
Down Last 30 Days	0	0	0	0
Down Last 60 Days	1	1	1	1

Magnitude - Consensus Estimate Trend

	Current Qtr (6/2020)	Next Qtr (9/2020)	Current Year (12/2020)	Next Year (12/2021)
Current	0 65	0 60	3 36	3 73
7 Days Ago	0 65	0 60	3 36	3 73
30 Days Ago	0 65	0 60	3 36	3 73
60 Days Ago	0 71	0 66	3 59	3 82
90 Days Ago	0 71	0 66	3 59	3 82

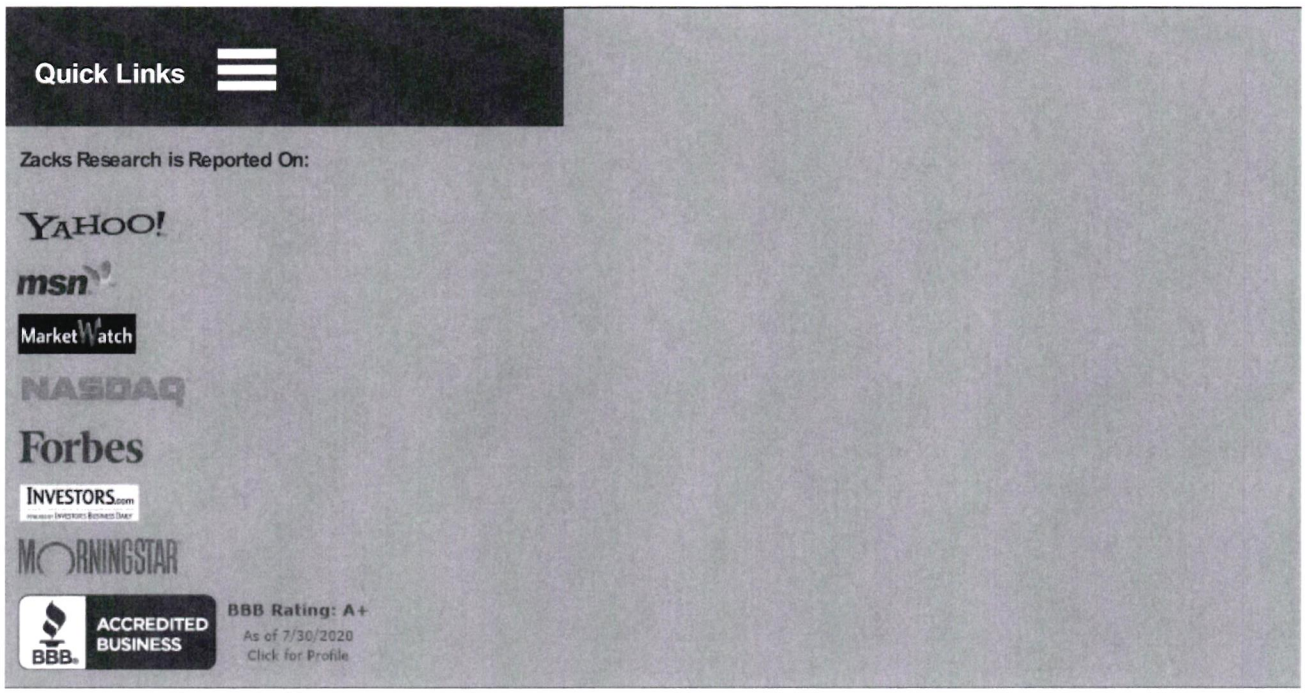
Upside - Most Accurate Estimate Versus Zacks Consensus

	Current Qtr (6/2020)	Next Qtr (9/2020)	Current Year (12/2020)	Next Year (12/2021)
Most Accurate Estimate	0 65	0 60	3 36	3 73
Zacks Consensus Estimate	0 65	0 60	3 36	3 73
Earnings ESP	0 00%	0 00%	0 00%	0 00%

Surprise - Reported Earnings History

	Quarter Ending (3/2020)	Quarter Ending (12/2019)	Quarter Ending (9/2019)	Quarter Ending (6/2019)	Average Surprise
Reported	1 28	0 92	0 60	0 66	NA
Estimate	1 23	0 92	0 70	0 66	NA

Difference	0.05	0.00	-0.10	0.00	-0.01
Surprise	Quarter Ending (3/2020)	Quarter Ending (12/2019)	Quarter Ending (9/2019)	Quarter Ending (6/2019)	Average Surprise



At the center of everything we do is a strong commitment to independent research and sharing its profitable discoveries with investors. This dedication to giving investors a trading advantage led to the creation of our proven Zacks Rank stock-rating system. Since 1988 it has more than doubled the S&P 500 with an average gain of +24.33% per year. These returns cover a period from January 1, 1988 through July 6, 2020. Zacks Rank stock-rating system returns are computed monthly based on the beginning of the month and end of the month Zacks Rank stock prices plus any dividends received during that particular month. A simple, equally-weighted average return of all Zacks Rank stocks is calculated to determine the monthly return. The monthly returns are then compounded to arrive at the annual return. Only Zacks Rank stocks included in Zacks hypothetical portfolios at the beginning of each month are included in the return calculations. Zacks Ranks stocks can, and often do, change throughout the month. Certain Zacks Rank stocks for which no month-end price was available, pricing information was not collected, or for certain other reasons have been excluded from these return calculations.

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Real time prices by BATS. Delayed quotes by Sungard.

NYSE and AMEX data is at least 20 minutes delayed. NASDAQ data is at least 15 minutes delayed.

Alliant Energy Corporation (LNT)

(Real Time Quote from BATS)

$53.33 USD

70544 (70582%)

Updated Jul 31, 2020 03 00 PM ET

Add to portfolio

Zacks Rank:

2-Buy

Style Scores:

D Value | B Growth | F Momentum | D VGM

Industry Rank:

Bottom 33% (169 out of 253)
Industry: Utility - Electric Power

View All Zacks #1 Ranked Stocks

Detailed Estimates

Estimates	
Next Report Date	*AMC 8/6/20
Current Quarter	NA
EPS Last Quarter	0.72
Last EPS Surprise	30 91%
ABR	1 50
Earnings ESP	NA
Current Year	2 41
Next Year	2.57
EPS (TTM)	2.50
P/E (F1)	22 41

*BMO = Before Market Open *AMC = After Market Close

Growth Estimates	LNT	IND	S&P
Current Qtr (06/2020)	NA	- 5 1	7-051
Next Qtr (09/2020)	NA	18530	724564
Current Year (12/2020)	4533	73510	NA
Next Year (12/2021)	6564	10500	26534
Past - Years	6530	- 530	NA
Next - Years	- 5 0	530	NA
PE	22541	18520	2453-
PEG Ratio	450-	2549	NA

Learn More About Estimate Research

See Brokerage Recommendations

See Earnings Report Transcript

Premium Research for LNT

Zacks Rank	**Buy 2**
Zacks Industry Rank	Bottom 33% (169 out of 2- 3)
Zacks Sector Rank	Bottom 31% (11 out of 16)
Style Scores	**D Value | B Growth | F Momentum | D VGM**
Earnings ESP	NA
Research Reports for LNT	Analyst | Snapshot

(= Change in last 30 days)

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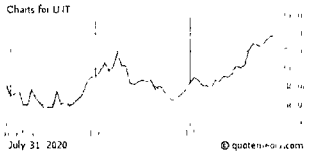
Research for LNT

Chart for LNT



Interactive Chart | Fundamental Charts

Sales Estimates

	Current Qtr (6/2020)	Next Qtr (9/2020)	Current Year (12/2020)	Next Year (12/2021)
Zacks Consensus Estimate	0500M	NA	NA	NA
# of Estimates	NA	NA	NA	NA
High Estimate	NA	NA	NA	NA
Low Estimate	NA	NA	NA	NA
Year ago Sales	90520M	990520M	35- B	NA
Year over Year Growth Est5	NA	NA	NA	NA

Earnings Estimates

	Current Qtr (6/2020)	Next Qtr (9/2020)	Current Year (12/2020)	Next Year (12/2021)
Zacks Consensus Estimate	NA	NA	2541	25
# of Estimates	NA	NA	2	2

Most Recent Consensus	Current Qtr (6/2020)	Next Qtr (9/2020)	Current Year (12/2020)	Next Year (12/2021)
High Estimate	NA	NA	2.42	2.58
Low Estimate	NA	NA	2.40	2.56
Year ago EPS	0.40	0.94	2.31	2.41
Year over Year Growth Est%	NA	NA	4.33%	6.64%

Agreement - Estimate Revisions

	Current Qtr (6/2020)	Next Qtr (9/2020)	Current Year (12/2020)	Next Year (12/2021)
Up Last Days	NA	NA	0	0
Up Last 30 Days	NA	NA	0	1
Up Last 60 Days	NA	NA	0	1
Down Last Days	NA	NA	0	0
Down Last 30 Days	NA	NA	0	0
Down Last 60 Days	NA	NA	0	0

Magnitude - Consensus Estimate Trend

	Current Qtr (6/2020)	Next Qtr (9/2020)	Current Year (12/2020)	Next Year (12/2021)
Current	NA	NA	2.41	2.5
Days Ago	NA	NA	2.41	2.5
30 Days Ago	NA	NA	2.41	2.5
60 Days Ago	NA	NA	2.41	2.5
90 Days Ago	NA	NA	2.43	2.58

Upside - Most Accurate Estimate Versus Zacks Consensus

	Current Qtr (6/2020)	Next Qtr (9/2020)	Current Year (12/2020)	Next Year (12/2021)
Most Accurate Estimate	NA	NA	2.41	2.58
Zacks Consensus Estimate	NA	NA	2.41	2.5
Earnings ESP	NA	NA	0.00%	0.39%

Surprise - Reported Earnings History

	Quarter Ending (3/2020)	Quarter Ending (12/2019)	Quarter Ending (9/2019)	Quarter Ending (6/2019)	Average Surprise
Reported	0.52	0.44	0.94	0.40	NA
Estimate	0.5 -	NA	NA	0.46	NA

	Quarter Ending (3/2020)	Quarter Ending (12/2019)	Quarter Ending (9/2019)	Quarter Ending (6/2019)	Average Surprise
Difference	0.01	NA	NA	0.06	0.06
Surprise	5.26%	NA	NA	7.06%	6.16%

Annual Estimates By Analyst

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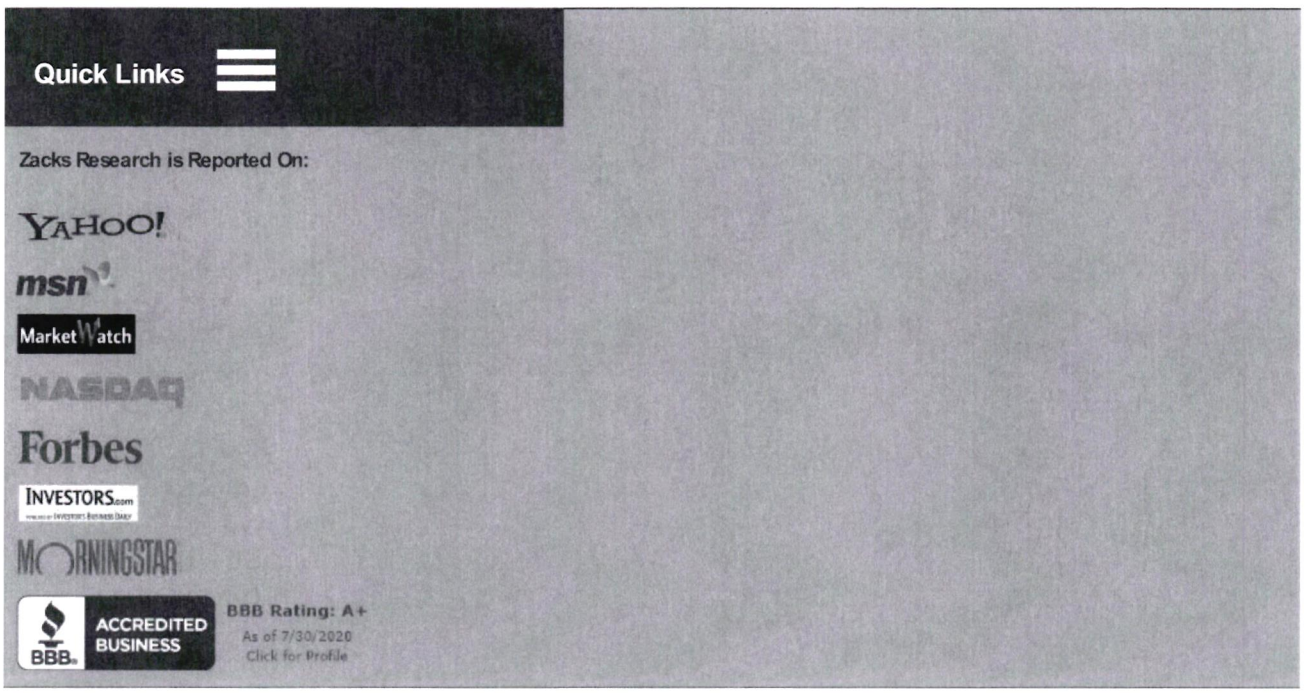

At the center of everything we do is a strong commitment to independent research and sharing its profitable discoveries with investors5This dedication to giving investors a trading advantage led to the creation of our proven Zacks Rank stock7rating system5Since 1988 it has more than doubled the S&P - 00 with an average gain of +245 3% per year5These returns cover a period from January 1, 1988 through July 6, 20205Zacks Rank stock7rating system returns are computed monthly based on the beginning of the month and end of the month Zacks Rank stock prices plus any dividends received during that particular month5A simple, ezually7weighted average return of all Zacks Rank stocks is calculated to determine the monthly return5The monthly returns are then compounded to arrive at the annual return5Only Zacks Rank stocks included in Zacks hypothetical portfolios at the beginning of each month are included in the return calculations5Zacks Ranks stocks can, and often do, change throughout the month5Certain Zacks Rank stocks for which no month7end price was available, pricing information was not collected, or for certain other reasons have been excluded from these return calculations5

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Real time prices by BATS5Delayed zuotes by Sungard5

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Ameren Corporation (AEE)

(Real Time Quote from BATS)

$79.51 USD

40.07 (40.09%)

Updated Jul - 1, 2020 0- 00 PM ET

Add to portfolio

Zacks Rank:

3-Hold

Style Scores:

C Value | C Growth | D Momentum | D VGM

Industry Rank:

Bottom 33% (169 out of 253)
Industry: Utility - Electric Power

View All Zacks #1 Ranked Stocks

Detailed Estimates

Estimates	
Next Report Date	*BMO 8/7/20
Current Quarter	0.95
EPS Last Quarter	0.59
Last EPS Surprise	-16.90%
ABR	1.55
Earnings ESP	0.00%
Current Year	3.46
Next Year	3.78
EPS (TTM)	3.16
P/E (F1)	23.15

*BMO = Before Market Open *AMC = After Market Close

Growth Estimates	AEE	IND	S&P
Current Qtr (06/2020)	-1.57	98.91	490.18
Next Qtr (05/2020)	7.86	13.30	427.67
Current Year (12/2020)	- .23	4. 10	NA
Next Year (12/2021)	5.29	10.00	26 - 7
Past 9 Years	8 - 0	9.30	NA
Next 9 Years	6.30	8.- 0	NA
PE	2- .19	13.20	27.- 9
PEG Ratio	- 7-	2.75	NA

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See Earnings Report Transcript

Premium Research for AEE

Zacks Rank	**Hold** 3
Zacks Industry Rank	Bottom - 3% (193 out of 29-)
Zacks Sector Rank	Bottom - 1% (11 out of 16)
Style Scores	**C** Value | **C** Growth | **D** Momentum | **D** VGM
Earnings ESP	0 00%
Research Reports for AEE	Analyst | Snapshot

(= Change in last - 0 days)

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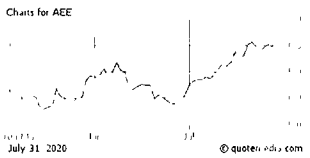
Research for AEE

Snapshot

Chart for AEE



Interactive Chart | Fundamental Charts

Sales Estimates

	Current Qtr (6/2020)	Next Qtr (9/2020)	Current Year (12/2020)	Next Year (12/2021)
Zacks Consensus Estimate	1.73B	1 81B	9 55B	6 - - B
# of Estimates	2	2	-	-
High Estimate	1 75B	1 8- B	6 0- B	6 - 8B
Low Estimate	1 78B	1 80B	9 59B	6 25B
Year ago Sales	1 - 3B	1 66B	9 51B	9 55B
Year over Year Growth Est.	8 26%	- 22%	1 - 6%	9 62%

Earnings Estimates

	Current Qtr (6/2020)	Next Qtr (9/2020)	Current Year (12/2020)	Next Year (12/2021)
Zacks Consensus Estimate	0 59	1 97	- 76	- 83
# of Estimates	-	-	9	9

Most Recent Consensus	Current Qtr (6/2020)	Next Qtr (9/2020)	Current Year (12/2020)	Next Year (12/2021)
High Estimate	0 55	1 98	- 90	- 39
Low Estimate	0 50	1 92	- 72	- 87
Year ago EPS	0 82	1 78	- -9	- 76
Year over Year Growth Est	-1 57%	7 86%	- 23%	5 03%

Agreement - Estimate Revisions

	Current Qtr (6/2020)	Next Qtr (9/2020)	Current Year (12/2020)	Next Year (12/2021)
Up Last 8 Days	1	0	1	0
Up Last -0 Days	-	1	7	2
Up Last 60 Days	-	2	7	2
Down Last 8 Days	0	0	0	1
Down Last -0 Days	0	1	0	1
Down Last 60 Days	0	0	0	1

Magnitude - Consensus Estimate Trend

	Current Qtr (6/2020)	Next Qtr (9/2020)	Current Year (12/2020)	Next Year (12/2021)
Current	0 59	1 97	- 76	- 83
8 Days Ago	0 57	1 97	- 76	- 83
-0 Days Ago	0 35	1 90	- 70	- 86
60 Days Ago	0 38	1 75	- 71	- 86
50 Days Ago	0 39	1 73	- 71	- 86

Upside - Most Accurate Estimate Versus Zacks Consensus

	Current Qtr (6/2020)	Next Qtr (9/2020)	Current Year (12/2020)	Next Year (12/2021)
Most Accurate Estimate	0 59	1 99	- 79	- 86
Zacks Consensus Estimate	0 59	1 97	- 76	- 83
Earnings ESP	0 00%	0 - - %	4 0 28%	4 0 72%

Surprise - Reported Earnings History

	Quarter Ending (3/2020)	Quarter Ending (12/2019)	Quarter Ending (9/2019)	Quarter Ending (6/2019)	Average Surprise
Reported	0 95	0 - 3	1 78	0 82	NA
Estimate	0 81	0 - 1	1 76	0 89	NA

Difference	40.12	0.06	0.01	40.0-	40.02
Surprise	Quarter Ending (3/2020)	Quarter Ending (12/2019)	Quarter Ending (9/2019)	Quarter Ending (6/2019)	Average Surprise

Quarterly Estimates By Analyst

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Annual Estimates By Analyst

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Zacks Research
Detailed Estimates

Quote or Search

Duke Energy Corporation (DUK)
(Real Time Quote from BATS)

$84.60 USD

Updated Jul 31, 2020 03 56 PM ET

Add to portfo

Zacks Rank
4-Sell

Style Scores.
C Value | B Growth | D Momentum | VGM

Industry Rank.
Bottom 33% (169 out of 253)

Industry: Utility - Electric Power

Duke Energy Corporation (DUK) Quote Overview » Estimates » Duke Energy Corporation (DUK) Detailed Estimates

Detailed Estimates

Enter Symbol

Estimates

Next Report Date	BMO 8/10/20	Earnings ESP	-0 10%
Current Quarter	1 04	Current Year	5 05
EPS Last Quarter	1 14	Next Year	5 26
Last EPS Surprise	-5 79%	EPS (TTM)	4 96
ABR	2 50	P/E (F1)	16 75

*BMO = Before Market Open *AMC = After Market Close

Growth Estimates	DUK	IND	S&P
Current Qtr (06/2020)	-7 14	48 40	-50 17
Next Qtr (09/2020)	-0 56	12 78	-24 64
Current Year (12/2020)	-0 20	-2 90	NA
Next Year (12/2021)	4 16	9 60	26 34
Past 5 Years	2 50	5 80	NA
Next 5 Years	4 30	7 20	NA
PE	16 75	18 30	24 35
PEG Ratio	3 86	2 54	NA

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Zacks Research is Reported On

BBB Rating A+

At the center of everything we do is a strong commitment to independent research and sharing its profitable discoveries with investors This dedication to giving investors a trading advantage led to the creation of our proven Zacks Rank stock rating system Since 1988 it has more than doubled the S&P 500 with an average gain of +24 33% per year These returns cover a period from January 1 1988 through July 6 2020 Zacks Rank stock-rating system returns are computed monthly based on the beginning of the month and end of the month Zacks Rank stock prices plus any dividends received during that particular month A simple equally-weighted average return of all Zacks Rank stocks is calculated to determine the monthly return The monthly returns are then compounded to arrive at the annual return Only Zacks Rank stocks included in Zacks hypothetical portfolios at the beginning of each month are included in the return calculations Zacks Ranks stocks can and often do change throughout the month Certain Zacks Rank stocks for which no month-end price was available pricing information was not collected or for certain other reasons have been excluded from these return calculations

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Real time prices by BATS Delayed quotes by Sungard

NYSE and AMEX data is at least 20 minutes delayed NASDAQ data is at least 15 minutes delayed

Up Last 7 Days	0	0	0	0
Up Last 30 Days	3	0	1	1
Up Last 60 Days	3	1	1	1
Down Last 7 Days	0	0	0	0
Down Last 30 Days	0	2	5	5
Down Last 60 Days	1	2	4	4

Magnitude - Consensus Estimate Trend

	Current Qtr (6/2020)	Next Qtr (9/2020)	Current Year (12/2020)	Next Year (12/2021)
Current	1 04	1 78	5 05	5 26
7 Days Ago	1 04	1 78	5 05	5 26
30 Days Ago	0 98	1 84	5 13	5 44
60 Days Ago	1 00	1 76	5 10	5 43
90 Days Ago	1 05	1 74	5 10	5 43

Upside - Most Accurate Estimate Versus Zacks Consensus

	Current Qtr (6/2020)	Next Qtr (9/2020)	Current Year (12/2020)	Next Year (12/2021)
Most Accurate Estimate	1 04	1 76	5 05	5 26
Zacks Consensus Estimate	1 04	1 78	5 05	5 26
Earnings ESP	0 10	-0 92	0 00%	0 00%

Surprise - Reported Earnings History

	Quarter Ending (3/2020)	Quarter Ending (12/2019)	Quarter Ending (9/2019)	Quarter Ending (6/2019)	Average Surprise
Reported	1 14	0 91	1 79	1 12	NA
Estimate	1 21	0 88	1 69	0 98	NA
Difference	-0 07	0 03	0 10	0 14	0 05
Surprise	-5 79	3 41	5 92	14 29	4 46

Quarterly Estimates By Analyst

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Annual Estimates By Analyst

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Quote or Search

Zacks Rank	Sell 4
Zacks Industry Rank	Bottom 33% (169 out of 253)
Zacks Sector Rank	Bottom 31% (11 out of 16)
Style Scores	**C Value	B Growth	D Momentum	VGM**
Earnings ESP	-0 10%
Research Reports for DUK	Analyst	Snapshot

(▲ ▼ = Change in last 30 days)

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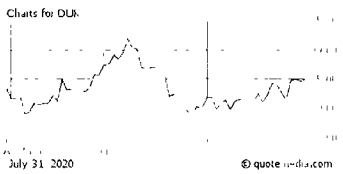
Research for DUK

Chart for DUK



Interactive Chart | Fundamental Charts

Sales Estimates

	Current Qtr (6/2020)	Next Qtr (9/2020)	Current Year (12/2020)	Next Year (12/2021)
Zacks Consensus Estimate	5 75B	6 94B	24 85B	25 68B
# of Estimates	2	2	3	3
High Estimate	5 86B	6 99B	25 02B	26 28B
Low Estimate	5 65B	6 89B	24 65B	24 89B
Year ago Sales	5 87B	6 94B	25 08B	24 85B
Year over Year Growth Est	-2 03%	0 00%	-0 90%	3 32%

Earnings Estimates

	Current Qtr (6/2020)	Next Qtr (9/2020)	Current Year (12/2020)	Next Year (12/2021)
Zacks Consensus Estimate	1 04	1 78	5 05	5 26
# of Estimates	5	4	6	6
Most Recent Consensus	1 05	1 79	5 05	5 19
High Estimate	1 05	1 83	5 10	5 44
Low Estimate	1 01	1 69	5 00	5 16
Year ago EPS	1 12	1 79	5 06	5 05
Year over Year Growth Est	-7 14%	-0 56%	-0 20%	4 06%

Agreement - Estimate Revisions

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- Income Statements
- Balance Sheet
- Cash Flow Statements
- Option Chain
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Quote or Search

Edison International (EIX)
(Real Time Quote from BATS)

$55.54 USD

Updated Jul 31, 2020 03 56 PM ET

Add to portfo

Zacks Rank
3-Hold

Style Scores.
B Value | D Growth | A Momentum | VGM

Industry Rank·
Bottom 33% (169 out of 253)

Industry: Utility - Electric Power

Edison International (EIX) Quote Overview » Estimates » Edison International (EIX) Detailed Estimates

Detailed Estimates

Enter Symbol

Estimates

Next Report Date	11/3/20	Earnings ESP	-0 63%
Current Quarter	1 45	Current Year	4 44
EPS Last Quarter	1 00	Next Year	4 52
Last EPS Surprise	-9 91%	EPS (TTM)	4 11
ABR	1 67	P/E (F1)	12 12

Growth Estimates	EIX	IND	S&P
Current Qtr (09/2020)	-2 68	57 51	-50 17
Next Qtr (12/2020)	30 30	18 80	-24 64
Current Year (12/2020)	-5 53	-3 10	NA
Next Year (12/2021)	1 80	10 00	26 34
Past 5 Years	2 40	5 80	NA
Next 5 Years	3 30	7 30	NA
PE	12 12	18 20	24 35
PEG Ratio	3 63	2 49	NA

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Quote or Search

Up Last 7 Days	2	2	1	2
Up Last 30 Days	2	2	3	4
Up Last 60 Days	2	2	2	3
Down Last 7 Days	0	0	0	0
Down Last 30 Days	0	1	1	1
Down Last 60 Days	0	1	1	1

Magnitude - Consensus Estimate Trend

	Current Qtr (9/2020)	Next Qtr (12/2020)	Current Year (12/2020)	Next Year (12/2021)
Current	1 45	1 29	4 44	4 52
7 Days Ago	1 44	1 27	4 43	4 52
30 Days Ago	1 41	1 32	4 44	4 51
60 Days Ago	1 41	1 32	4 44	4 52
90 Days Ago	1 31	1 49	4 47	4 56

Upside - Most Accurate Estimate Versus Zacks Consensus

	Current Qtr (9/2020)	Next Qtr (12/2020)	Current Year (12/2020)	Next Year (12/2021)
Most Accurate Estimate	1 44	1 29	4 44	4 52
Zacks Consensus Estimate	1 45	1 29	4 44	4 52
Earnings ESP	-0 69	0 00%	-0 0[illegible]	0 00%

Surprise - Reported Earnings History

	Quarter Ending (6/2020)	Quarter Ending (3/2020)	Quarter Ending (12/2019)	Quarter Ending (9/2019)	Average Surprise
Reported	1 00	0 63	0 99	1 49	NA
Estimate	1 11	0 77	1 04	1 53	NA
Difference	-0 11	-0 14	-0 05	-0 04	-0 09
Surprise	-9 91%	-18 18%	-4 81%	-2 61%	-8 88%

Quarterly Estimates By Analyst

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Annual Estimates By Analyst

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Visit www zacksdata com to get our data and content for your mobile app or website

Real time prices by BATS Delayed quotes by Sungard

NYSE and AMEX data is at least 20 minutes delayed NASDAQ data is at least 15 minutes delayed

Zacks Rank	Hold
Zacks Industry Rank	Bottom 33% (169 out of 253)
Zacks Sector Rank	Bottom 31% (11 out of 16)
Style Scores	**B Value | D Growth | A Momentum | VGM**
Earnings ESP	-0 63%
Research Reports for EIX	Analyst | Snapshot

(▲ ▼ = Change in last 30 days)

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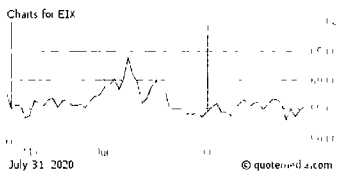
Research for EIX

Chart for EIX



Interactive Chart | Fundamental Charts

Sales Estimates

	Current Qtr (9/2020)	Next Qtr (12/2020)	Current Year (12/2020)	Next Year (12/2021)
Zacks Consensus Estimate	3 98B	3 06B	12 79B	13 27B
# of Estimates	2	2	3	3
High Estimate	4 07B	3 07B	12 99B	13 59B
Low Estimate	3 89B	3 06B	12 66B	12 83B
Year ago Sales	3 74B	2 97B	12 35B	12 79B
Year over Year Growth Est	6 37%	3 20%	3 58%	3 75%

Earnings Estimates

	Current Qtr (9/2020)	Next Qtr (12/2020)	Current Year (12/2020)	Next Year (12/2021)
Zacks Consensus Estimate	1 45	1 29	4 44	4 52
# of Estimates	4	4	5	5
Most Recent Consensus	1 52	1 10	4 34	4 59
High Estimate	1 56	1 44	4 49	4 62
Low Estimate	1 22	1 10	4 34	4 43
Year ago EPS	1 49	0 99	4 70	4 44
Year over Year Growth Est	-2 68%	30 30%	-5 53%	1 98%

Agreement - Estimate Revisions

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Detailed Estimates

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- Cash Flow Statements

- Option Chain
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Quote or Search

Entergy Corporation (ETR)
(Real Time Quote from BATS)

$105.12 USD

+0.46 (0.46%)

Updated Jul 31, 2020 03:56 PM ET

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Zacks Rank:
2-Buy

Style Scores:
B Value | C Growth | C Momentum | B VGM

Industry Rank:
Bottom 33% (169 out of 253)
Industry: Utility - Electric Power

Detailed Estimates

Enter Symbol

Estimates

Next Report Date	11/4/20	Earnings ESP	-1.45%
Current Quarter	2.47	Current Year	5.54
EPS Last Quarter	1.37	Next Year	5.94
Last EPS Surprise	11.38%	EPS (TTM)	5.71
ABR	1.46	P/E (F1)	18.80

Growth Estimates	ETR	IND	S&P
Current Qtr (09/2020)	-1.98	57.51	-50.17
Next Qtr (12/2020)	8.82	18.80	-24.64
Current Year (12/2020)	2.59	-3.10	NA
Next Year (12/2021)	7.22	10.00	26.34
Past 5 Years	-1.20	5.80	NA
Next 5 Years	5.70	7.30	NA
PE	18.80	18.20	24.35
PEG Ratio	3.28	2.49	NA

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Up Last 7 Days	1	0	1	1
Up Last 30 Days	1	0	2	1
Up Last 60 Days	1	0	3	2
Down Last 7 Days	0	1	0	0
Down Last 30 Days	1	2	0	0
Down Last 60 Days	1	2	0	0

Magnitude - Consensus Estimate Trend

	Current Qtr (9/2020)	Next Qtr (12/2020)	Current Year (12/2020)	Next Year (12/2021)
Current	2 47	0 74	5 54	5 94
7 Days Ago	2 47	0 75	5 54	5 94
30 Days Ago	2 58	0 63	5 54	5 94
60 Days Ago	2 58	0 63	5 53	5 93
90 Days Ago	2 49	0 80	5 50	5 94

Upside - Most Accurate Estimate Versus Zacks Consensus

	Current Qtr (9/2020)	Next Qtr (12/2020)	Current Year (12/2020)	Next Year (12/2021)
Most Accurate Estimate	2 44	0 78	5 61	5 92
Zacks Consensus Estimate	2 47	0 74	5 54	5 94
Earnings ESP	1 45 %	6 21 %	1 26 %	-0 37 %

Surprise - Reported Earnings History

	Quarter Ending (6/2020)	Quarter Ending (3/2020)	Quarter Ending (12/2019)	Quarter Ending (9/2019)	Average Surprise
Reported	1 37	1 14	0 68	2 52	NA
Estimate	1 23	0 94	0 66	2 31	NA
Difference	0 14	0 20	0 02	0 21	0 14
Surprise	11 38 %	21 28 %	3 03 %	9 09 %	11 20 %

Quarterly Estimates By Analyst

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Zacks Research is Reported On

At the center of everything we do is a strong commitment to independent research and sharing its profitable discoveries with investors This dedication to giving investors a trading advantage led to the creation of our proven Zacks Rank stock-rating system Since 1988 it has more than doubled the S&P 500 with an average gain of +24 33% per year These returns cover a period from January 1 1988 through July 6 2020 Zacks Rank stock rating system returns are computed monthly based on the beginning of the month and end of the month Zacks Rank stock prices plus any dividends received during that particular month A simple equally-weighted average return of all Zacks Rank stocks is calculated to determine the monthly return The monthly returns are then compounded to arrive at the annual return Only Zacks Rank stocks included in Zacks hypothetical portfolios at the beginning of each month are included in the return calculations Zacks Ranks stocks can and often do change throughout the month Certain Zacks Rank stocks for which no month-end price was available pricing information was not collected or for certain other reasons have been excluded from these return calculations

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NYSE and AMEX data is at least 20 minutes delayed NASDAQ data is at least 15 minutes delayed

Zacks Rank	▲ **Buy** [2]
Zacks Industry Rank	Bottom 38% (158 out of 253)
Zacks Sector Rank	Bottom 31% (11 out of 16)
Style Scores	**B Value | C Growth | C Momentum | ☐ VGM**
Earnings ESP	-1 45%
Research Reports for ETR	Analyst | Snapshot

(▲ ▼ = Change in last 30 days)
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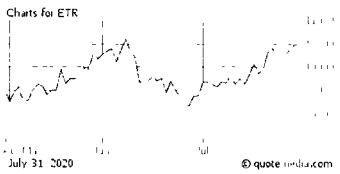
Research for ETR

Chart for ETR



Interactive Chart | Fundamental Charts

Sales Estimates

	Current Qtr (9/2020)	Next Qtr (12/2020)	Current Year (12/2020)	Next Year (12/2021)
Zacks Consensus Estimate	3 25B	2 50B	11 13B	11 30B
# of Estimates	1	1	3	3
High Estimate	3 25B	2 50B	11 88B	11 99B
Low Estimate	3 25B	2 50B	10 54B	10 84B
Year ago Sales	3 14B	2 46B	10 88B	11 13B
Year over Year Growth Est	3 46%	1 52%	2 35%	1 46%

Earnings Estimates

	Current Qtr (9/2020)	Next Qtr (12/2020)	Current Year (12/2020)	Next Year (12/2021)
Zacks Consensus Estimate	2 47	0 74	5 54	5 94
# of Estimates	4	4	4	5
Most Recent Consensus	1 10	2 47	5 61	6 02
High Estimate	2 71	1 19	5 61	6 02
Low Estimate	2 13	0 47	5 48	5 90
Year ago EPS	2 52	0 68	5 40	5 54
Year over Year Growth Est	-1 98%	8 82%	2 59%	7 26%

Agreement - Estimate Revisions

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A et , I rnA (LdEA e)
(Real Time Quote from BATS)
$U1L14Z&I

81-05 (81-16%)
Updated Jul 1, 2020 0 :00 PM ET

Add to portfolio

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Next Report Date	*Bb. 5206216
Current Quarter	4L47
EPS Last Quarter	6L5%
Last EPS Surprise	3e
ABR	1L66

c

Earnings ESP	6L66G
Current Year	%Lhh
Next Year	%L56
EPS (TTM)	%Lh6
P/E (F1)	16L70

*BMO = Before Market Open *AMC = After Market Close

Nio» CSornaQD dQ a	A e	A I	&PI
Current Qtr (06/2020)	12- 5	79-71	870-19
Next Qtr (04/2020)	NA	15-50	823-63
Current Year (12/2020)	81- 0	8 -10	NA
Next Year (12/2021)	. -. 0	10-00	26- 3
Past 7 Years	3-00	7-50	NA
Next 7 Years	2-60	9- 0	NA
PE	20-5	15-20	23- 7
PEG Ratio	9-42	2-34	NA

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: d(kacA / uaQVc d. k	Bottom 5% (175 out of 27.)
: d(kac&v(Qic d. k	Bottom 1% (11 out of 16)
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Analyst Snapshot

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Interactive Chart | Fundamental Charts

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	t uiiv QQQc (E 21616)	3vYQQQc (EU21616)	t uiiv QHvdic (E121616)	3vYQHvdic (E121614)
Zacks Consensus Estimate	0-00M	NA	NA	NA
# of Estimates	NA	NA	NA	NA
High Estimate	NA	NA	NA	NA
Low Estimate	NA	NA	NA	NA
Year ago Sales	16-40M	56- 2M	1- 7B	NA
Year over Year Growth Est-	NA	NA	NA	NA

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	t uiiv QQQc (E 21616)	3vYQQQc (EU21616)	t uiiv QHvdic (E121616)	3vYQHvdic (E121614)
Zacks Consensus Estimate	1-15	NA	3-77	3-90
# of Estimates	1	NA	1	1

Most Recent Consensus	t uiiv QQQc (12/16)	3vYQQQc (12/16)	t uiiv. QHvdic (12/16)	3vYQHvdic (12/14)
High Estimate	1-15	NA	3-77	3-90
Low Estimate	1-15	NA	3-77	3-90
Year ago EPS	1-07	1-95	3-61	3-77
Year over Year Growth Est-	12- 5%	NA	81- 0%	- 0%

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	t uiiv. QQQc (12/16)	3vYQQQc (12/16)	t uiiv QHvdic (12/16)	3vYQHvdic (12/14)
Up Last 9 Days	0	NA	0	0
Up Last 0 Days	0	NA	0	0
Up Last 60 Days	0	NA	0	0
Down Last 9 Days	0	NA	0	0
Down Last 0 Days	0	NA	0	0
Down Last 60 Days	0	NA	0	0

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	t uiiv QQQc (12/16)	3vYQQQc (12/16)	t uiiv QHvdic (12/16)	3vYQHvdic (12/14)
Current	1-15	NA	3-77	3-90
9 Days Ago	1-15	NA	3-77	3-90
0 Days Ago	NA	NA	3-77	3-90
60 Days Ago	NA	NA	3-77	3-90
40 Days Ago	NA	NA	3-76	3-91

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	t uiiv QQQc (12/16)	3vYQQQc (12/16)	t uiiv QHvdic (12/16)	3vYQHvdic (12/14)
Most Accurate Estimate	1-15	NA	3-77	3-90
Zacks Consensus Estimate	1-15	NA	3-77	3-90
Earnings ESP	0-00%	NA	0-00%	0-00%

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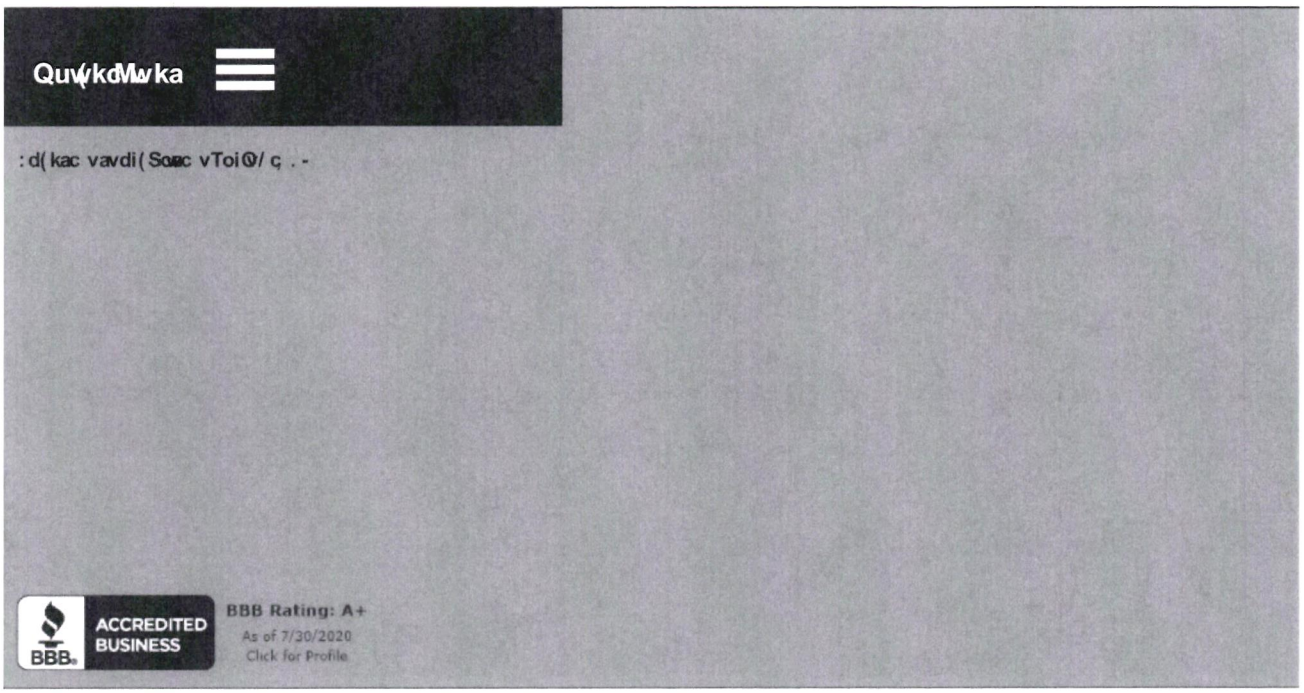
	Qudi1 m / wgc (12/16)	Qudi1 m / wgc (12/14U)	Qudi1 m / wgc (12/14U)	Qudi1 m / wgc (12/14U)	er vidgv &uiTiwv
Reported	0-93	0-4	1-95	1-07	NA
Estimate	NA	NA	NA	1-19	NA

Difference	NA	NA	NA	80-12	80-12
Surprise	NA	NA	NA		



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Real time prices by BATS- Delayed quotes by Sungard-

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NorthWestern Corporation (NWE)

(Real Time Quote from BATS)

$55.68 USD

-0.73 (-1.29%)

Updated Jul 31, 2020 03:02 PM ET

Add to portfolio

Zacks Rank:

3-Hold

Style Scores:

B Value | D Growth | C Momentum | C VGM

Industry Rank:

Bottom 33% (169 out of 253)
Industry: Utility - Electric Power

View All Zacks #1 Ranked Stocks

Detailed Estimates

Estimates	
Next Report Date	11/3/20
Current Quarter	NA
EPS Last Quarter	0.42
Last EPS Surprise	-16.00%
ABR	2.50
Earnings ESP	NA
Current Year	3.35
Next Year	3.50
EPS (TTM)	3.17
P/E (F1)	16.84

Growth Estimates	NWE	IND	S&P
Current Qtr (09/2020)	NA	57.51	-50.17
Next Qtr (12/2020)	NA	18.80	-24.64
Current Year (12/2020)	-2.05	-3.10	NA
Next Year (12/2021)	4.48	10.00	26.34
Past 5 Years	4.20	5.80	NA
Next 5 Years	3.40	7.30	NA
PE	16.84	18.20	24.35
PEG Ratio	4.97	2.49	NA

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See Earnings Report Transcript

Premium Research for NWE

Zacks Rank	**Hold** 3
Zacks Industry Rank	Bottom 38% (158 out of 253)
Zacks Sector Rank	Bottom 31% (11 out of 16)
Style Scores	**B** Value | **D** Growth | **C** Momentum | **C** VGM
Earnings ESP	NA
Research Report for NWE	Snapshot

(▲ ▼ = Change in last 30 days)
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More Premium Research » »

Research for NWE

Chart for NWE

Interactive Chart | Fundamental Charts

Sales Estimates

	Current Qtr (9/2020)	Next Qtr (12/2020)	Current Year (12/2020)	Next Year (12/2021)
Zacks Consensus Estimate	0 00M	NA	NA	NA
# of Estimates	NA	NA	NA	NA
High Estimate	NA	NA	NA	NA
Low Estimate	NA	NA	NA	NA
Year ago Sales	274 84M	328 14M	1 26B	NA
Year over Year Growth Est	NA	NA	NA	NA

Earnings Estimates

	Current Qtr (9/2020)	Next Qtr (12/2020)	Current Year (12/2020)	Next Year (12/2021)
Zacks Consensus Estimate	NA	NA	3 35	3 50
# of Estimates	NA	NA	1	1
Most Recent Consensus	NA	NA	NA	NA
High Estimate	NA	NA	3 35	3 50

	Current Qtr (9/2020)	Next Qtr (12/2020)	Current Year (12/2020)	Next Year (12/2021)
Low Estimate	NA	NA	3.35	3.50
Year ago EPS	0.50	1.19	3.42	3.35
Year over Year Growth Est	NA	NA	-2.05%	4.48%

Agreement - Estimate Revisions

	Current Qtr (9/2020)	Next Qtr (12/2020)	Current Year (12/2020)	Next Year (12/2021)
Up Last 7 Days	NA	NA	0	0
Up Last 30 Days	NA	NA	0	0
Up Last 60 Days	NA	NA	0	0
Down Last 7 Days	NA	NA	0	0
Down Last 30 Days	NA	NA	0	0
Down Last 60 Days	NA	NA	0	0

Magnitude - Consensus Estimate Trend

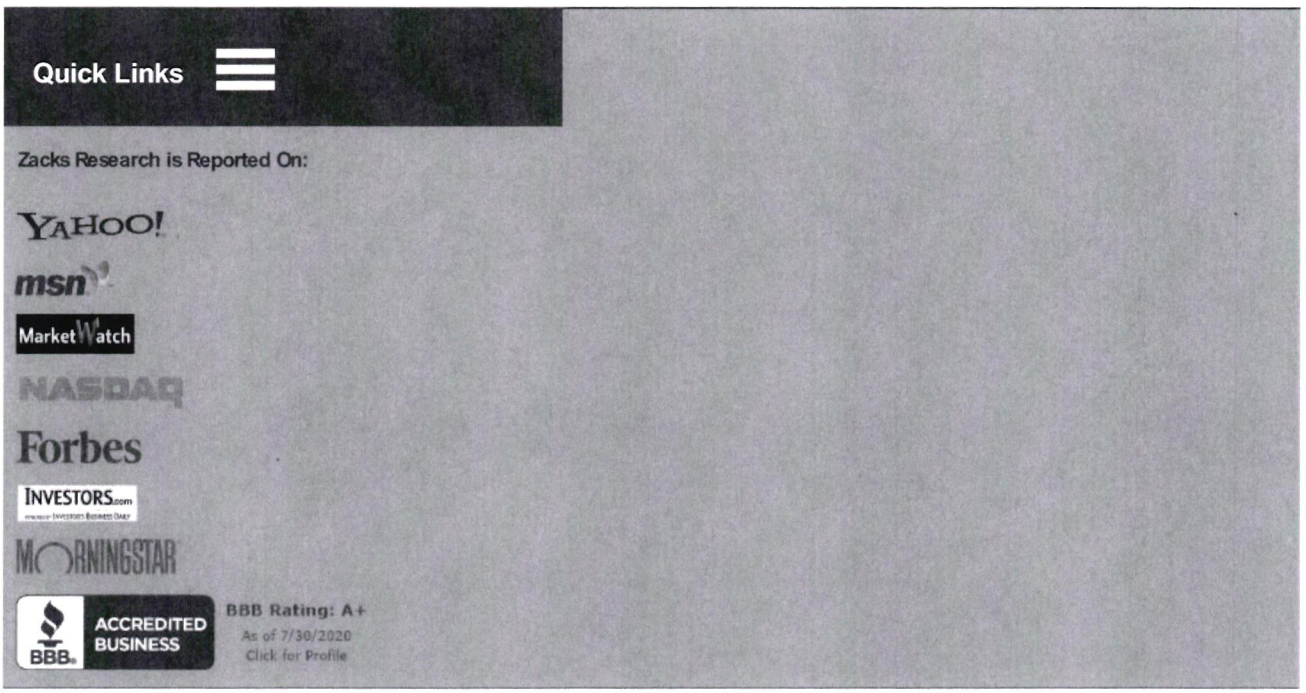
	Current Qtr (9/2020)	Next Qtr (12/2020)	Current Year (12/2020)	Next Year (12/2021)
Current	NA	NA	3.35	3.50
7 Days Ago	NA	NA	3.35	3.50
30 Days Ago	NA	NA	3.35	3.50
60 Days Ago	NA	NA	3.35	3.50
90 Days Ago	NA	NA	3.35	3.50

Upside - Most Accurate Estimate Versus Zacks Consensus

	Current Qtr (9/2020)	Next Qtr (12/2020)	Current Year (12/2020)	Next Year (12/2021)
Most Accurate Estimate	NA	NA	3.35	3.50
Zacks Consensus Estimate	NA	NA	3.35	3.50
Earnings ESP	NA	NA	0.00%	0.00%

Surprise - Reported Earnings History

	Quarter Ending (6/2020)	Quarter Ending (3/2020)	Quarter Ending (12/2019)	Quarter Ending (9/2019)	Average Surprise
Reported	0.42	1.06	1.19	0.50	NA
Estimate	0.50	1.26	1.19	0.63	NA
Difference	-0.08	-0.20	0.00	-0.13	-0.10
Surprise	16.00%	-15.87%	0.00%	-20.63%	-13.13%



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OGE Energy Corporation (OGE)

(Real Time Quote from BATS)

$32.63 USD

70-36 (71-09%)

Updated Jul 31, 2020 03:06 PM ET

Add to portfolio

Zacks Rank:

3-Hold

Style Scores:

D Value | D Growth | C Momentum | D VGM

Industry Rank:

Bottom 33% (169 out of 253)
Industry: Utility - Electric Power

View All Zacks #1 Ranked Stocks

Trades from

Detailed Estimates

Estimates	
Next Report Date	*BMO 8/6/20
Current Quarter	0.55
EPS Last Quarter	0.23
Last EPS Surprise	27.78%
ABR	1.86
Earnings ESP	0.00%
Current Year	2.11
Next Year	2.28
EPS (TTM)	2.16
P/E (F1)	15.69

*BMO = Before Market Open *AMC = After Market Close

Growth Estimates	OGE	IND	S&P
Current Qtr (06/2020)	10-00	5- 1	7 0-15
Next Qtr (09/2020)	NA	18-80	724-64
Current Year (12/2020)	72-31	73-10	NA
Next Year (12/2021)	8-06	10-00	26-34
Past Years	2-80	-80	NA
Next Years	3-50	5-30	NA
PE	1 -69	18-20	24-3.
PEG Ratio	4-2	2-49	NA

Learn More About Estimate Research

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Premium Research for OGE

Zacks Rank	**Hold** 3
Zacks Industry Rank	Bottom 38% (1. 8 out of 2. 3)
Zacks Sector Rank	Bottom 31% (11 out of 16)
Style Scores	**D Value | D Growth | C Momentum | D VGM**
Earnings ESP	0-00%
Research Reports for OGE	Analyst | Snapshot

(▲ ▼ = Change in last 30 days)

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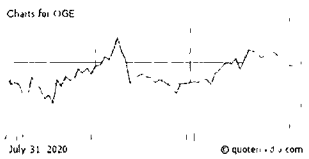
Research for OGE

Analyst Snapshot

Chart for OGE



Interactive Chart | Fundamental Charts

Sales Estimates

	Current Qtr (6/2020)	Next Qtr (9/2020)	Current Year (12/2020)	Next Year (12/2021)
Zacks Consensus Estimate	0-00M	NA	NA	NA
# of Estimates	NA	NA	NA	NA
High Estimate	NA	NA	NA	NA
Low Estimate	NA	NA	NA	NA
Year ago Sales	13-50M	5 -40M	2-23B	NA
Year over Year Growth Est-	NA	NA	NA	NA

Earnings Estimates

	Current Qtr (6/2020)	Next Qtr (9/2020)	Current Year (12/2020)	Next Year (12/2021)
Zacks Consensus Estimate	0-	NA	2-11	2-28
# of Estimates	1	NA	2	2

Most Recent Consensus	Current Qtr (6/2020)	Next Qtr (9/2020)	Current Year (12/2020)	Next Year (12/2021)
High Estimate	0-	NA	2-11	2-3
Low Estimate	0-	NA	2-10	2-20
Year ago EPS	0- 0	1-2	2-16	2-11
Year over Year Growth Est-	10-00%	NA	72-31%	8-06%

Agreement - Estimate Revisions

	Current Qtr (6/2020)	Next Qtr (9/2020)	Current Year (12/2020)	Next Year (12/2021)
Up Last 5 Days	0	NA	0	0
Up Last 30 Days	1	NA	0	0
Up Last 60 Days	1	NA	0	0
Down Last 5 Days	0	NA	0	0
Down Last 30 Days	0	NA	0	0
Down Last 60 Days	0	NA	0	0

Magnitude - Consensus Estimate Trend

	Current Qtr (6/2020)	Next Qtr (9/2020)	Current Year (12/2020)	Next Year (12/2021)
Current	0-	NA	2-11	2-28
5 Days Ago	0-	NA	2-11	2-28
30 Days Ago	0-49	NA	2-11	2-28
60 Days Ago	0-49	NA	2-11	2-28
90 Days Ago	NA	NA	2-19	2-24

Upside - Most Accurate Estimate Versus Zacks Consensus

	Current Qtr (6/2020)	Next Qtr (9/2020)	Current Year (12/2020)	Next Year (12/2021)
Most Accurate Estimate	0-	NA	2-11	2-28
Zacks Consensus Estimate	0-	NA	2-11	2-28
Earnings ESP	0-00%	NA	0-00%	0-00%

Surprise - Reported Earnings History

	Quarter Ending (3/2020)	Quarter Ending (12/2019)	Quarter Ending (9/2019)	Quarter Ending (6/2019)	Average Surprise
Reported	0-23	0-18	1-2	0- 0	NA
Estimate	0-18	0-29	1-1	0-48	NA

Difference	0-0. Quarter Ending (3/2020)	0-11 Quarter Ending (12/2019)	0-10 Quarter Ending (9/2019)	0-02 Quarter Ending (6/2019)	0-02 Average
Surprise					Surprise

Annual Estimates By Analyst

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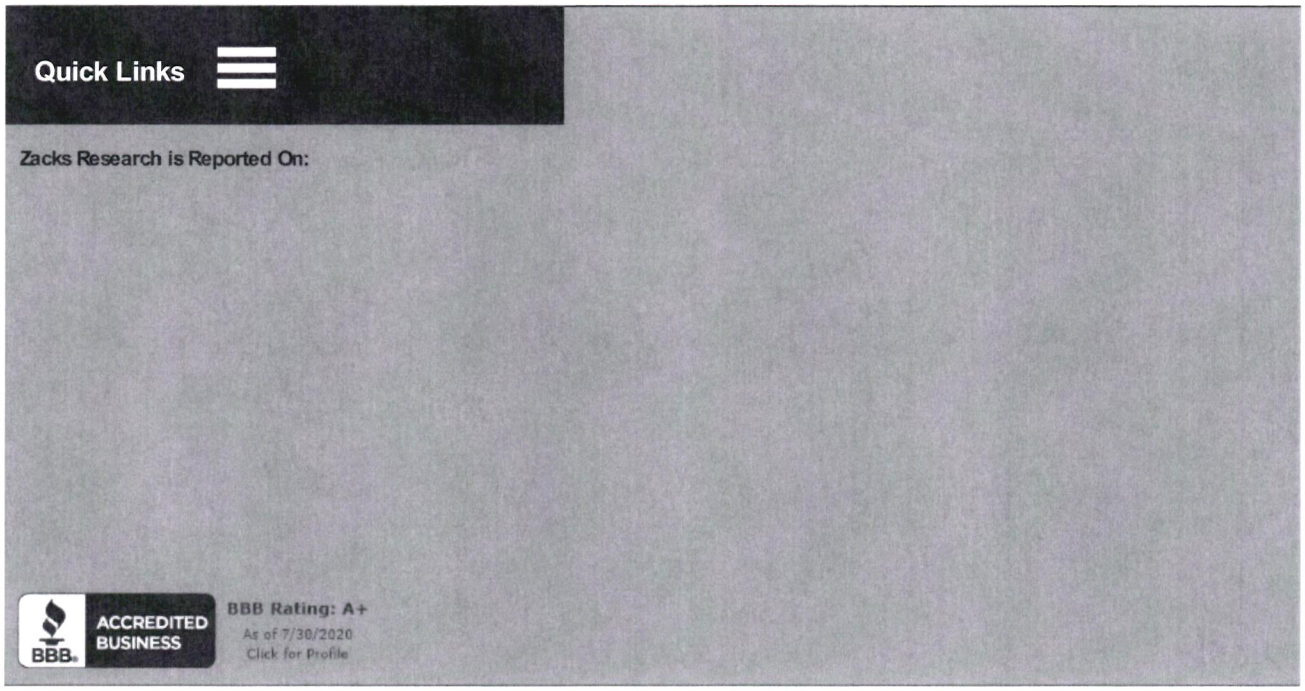

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Amern Cqea t ri t rCnd (rEA) Q
(Real Time Quote from BATS)
$2%U-rZSd

-0 81 (-2 34%)
Updated Jul 31, 2020 03 06 PM ET

Add to portfolio

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Next Report Date	*bMa / 7270.
Current Quarter	. 925
EPS Last Quarter	. 9 .
Last EPS Surprise	1669% 3
ABR	094.

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Earnings ESP	. 9 . 3
Current Year	0960
Next Year	0900
EPS (TTM)	0960
P/E (F1)	6/ 94-

*BMO = Before Market Open *AMC = After Market Close

Grt wrhrsDnd CnaD	A)	INd	S&P
Current Qtr (06/2020)	-12 52	79.71	-70 19
Next Qtr (08/2020)	1.61	15 50	-24 64
Current Year (12/2020)	-2 30	-3.10	NA
Next Year (12/2021)	4 92	10 00	26 34
Past 7 Years	9 30	7.50	NA
Next 7 Years	NA	9 30	NA
PE	15 76	15 20	24 37
PEG Ratio	NA	2 48	NA

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: CckD) C(k	△ yt p8 2
: CckDl(8CDrM) C(k	Bottom 35% (175 out of 273)
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Interactive Chart | Fundamental Charts

SCpeDrs Drd CreD

	aCrre(rru rrn E 70 0 Q	Nexrru rrn EU70 0 Q	aCrre(rrYeCrn E5070 0 Q	NexrrYeCrn E5070 06Q
Zacks Consensus Estimate	208 50M	230 20M	587 50M	870 80M
# of Estimates	1	1	1	1
Hgh Estimate	208 50M	230 20M	587 50M	870 80M
Low Estimate	208 50M	230 20M	587 50M	870 80M
Year ago Sales	228 20M	225 67M	818 70M	587 50M
Year over Year Growth Est	-5 46%	0 65%	-2 75%	6 17%

s Cr(q gDrs Drd CreD

	aCrre(rru rrn E 70 0 Q	Nexrru rrn EU70 0 Q	aCrre(rrYeCrn E5070 0. Q	NexrrYeCrn E5070 06Q
Zacks Consensus Estimate	0 34	0 63	2 12	2 22
# of Estimates	1	1	1	1

Most Recent Consensus	aQrre(mu m E 70 0 Q	Nexmu m EU70 0 Q	aQrre(mYeQn E6070 0 Q	NexmYeQn E6070 06Q
High Estimate	0 34	0 63	2 12	2 22
Low Estimate	0 34	0 63	2 12	2 22
Year ago EPS	0 38	0 62	2 19	2 12
Year over Year Growth Est	-12 52%	1 61%	-2 30%	4 92%

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	aQrre(mu m E 70 0 Q	Nexmu m EU70 0 Q	aQrre(mYeQn E6070 0 Q	NexmYeQn E6070 06Q
Up Last 9 Days	0	0	0	0
Up Last 30 Days	0	0	0	0
Up Last 60 Days	0	0	0	0
Down Last 9 Days	0	0	0	0
Down Last 30 Days	0	0	0	0
Down Last 60 Days	0	0	0	0

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	aQrre(mu m E 70 0 Q	Nexmu m EU70 0 Q	aQrre(mYeQn E6070 0 Q	NexmYeQn E6070 06Q
Current	0 34	0 63	2 12	2 22
9 Days Ago	0 34	0 63	2 12	2 22
30 Days Ago	0.34	0 63	2 12	2.22
60 Days Ago	0 34	0 63	2 12	2 22
80 Days Ago	0 38	0 67	2 25	2 71

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	aQrre(mu m E 70 0 Q	Nexmu m EU70 0 Q	aQrre(mYeQn E6070 0 Q	NexmYeQn E6070 06Q
Most Accurate Estimate	0 34	0 63	2 12	2 22
Zacks Consensus Estimate	0 34	0 63	2 12	2 22
Earnings ESP	0 00%	0 00%	0 00%	0 00%

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	u QQrrar s(8q gn E270 0 Q	u QQrrar s(8q gn E6070 6UQ	u QQrrar s(8q gn EU70 6UQ	u QQrrar s(8q gn E 70 6UQ	bverQge SQri rcDe
Reported	0 60	0 71	0 62	0 38	NA
Estimate	0 65	0 71	NA	NA	NA

Difference	-0.05	0.00	NA	NA	-0.04
Surprise	-11.96%	0.00%	NA	NA	-7.58%

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MarketWatch

NASDAQ

Forbes

INVESTORS.com

MORNINGSTAR

ACCREDITED BUSINESS BBB

BBB Rating: A+
As of 7/30/2020
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Pinnacle West Capital Corporation (PNW)

(Real Time Quote from BATS)

$81.85 USD

70-59 (71-03%)

Updated Jul 31, 2020 03 06 PM ET

Zacks Rank:

3-Hold

Style Scores:

C Value | C Growth | C Momentum | C VGM

Industry Rank:

Bottom 33% (169 out of 253)
Industry: Utility - Electric Power

Detailed Estimates

Estimates	
Next Report Date	*BMO 8/6/20
Current Quarter	1.41
EPS Last Quarter	0.27
Last EPS Surprise	68.75%
ABR	2.11
Earnings ESP	5.07%
Current Year	4.83
Next Year	4.97
EPS (TTM)	4.89
P/E (F1)	17.00

*BMO = Before Market Open *AMC = After Market Close

Growth Estimates	PNW	IND	S&P
Current Qtr (06/2020)	10-16	5- 0	790-18
Next Qtr (04/2020)	72-93	12-85	72. -6.
Current Year (12/2020)	1-26	72-40	NA
Next Year (12/2021)	2-40	4-60	26-3.
Past 9 Years	9-10	9-50	NA
Next 9 Years	-80	8-20	NA
PE	18-12	15-30	2 -39
PEG Ratio	3-6.	2-9	NA

Learn More About Estimate Research

See Brokerage Recommendations

See Earnings Report Transcript

Premium Research for PNW

Zacks Rank	**Hold** 3
Zacks Industry Rank	Bottom 33% (164 out of 293)
Zacks Sector Rank	Bottom 31% (11 out of 16)
Style Scores	**C Value | C Growth | C Momentum | C VGM**
Earnings ESP	9-08%
Research Reports for PNW	Analyst | Snapshot

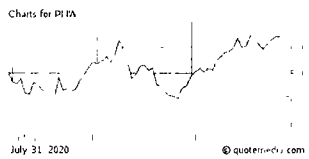
(▲ ▼ = Change in last 30 days)

View All Zacks Rank #1 Strong Buys

More Premium Research » »

Research for PNW Snapshot

Chart for PNW



Interactive Chart | Fundamental Charts

Sales Estimates

	Current Qtr (6/2020)	Next Qtr (9/2020)	Current Year (12/2020)	Next Year (12/2021)
Zacks Consensus Estimate	402-00M	1-20B	3-93B	3-86B
# of Estimates	1	1	2	2
High Estimate	402-00M	1-20B	3-99B	3-86B
Low Estimate	402-00M	1-20B	3-92B	3-89B
Year ago Sales	564-90M	1-14B	3- 8B	3-93B
Year over Year Growth Est-	3-8 %	0-4 %	1-83%	6-35%

Earnings Estimates

	Current Qtr (6/2020)	Next Qtr (9/2020)	Current Year (12/2020)	Next Year (12/2021)
Zacks Consensus Estimate	1- 1	2-80	-53	-48

# of Estimates	Current Qtr (6/2020) 3	Next Qtr (9/2020) 2	Current Year (12/2020) 2	Next Year (12/2021) 3
Most Recent Consensus	1- 2	2-88	-56	9-12
High Estimate	1-99	2-88	-56	9-12
Low Estimate	1-28	2-62	-50	-5
Year ago EPS	1-25	2-88	-88	-53
Year over Year Growth Est-	10-16%	72-93%	1-26%	2-48%

Agreement - Estimate Revisions

	Current Qtr (6/2020)	Next Qtr (9/2020)	Current Year (12/2020)	Next Year (12/2021)
Up Last 8 Days	0	0	0	0
Up Last 30 Days	2	0	2	0
Up Last 60 Days	1	0	2	0
Down Last 8 Days	0	0	0	1
Down Last 30 Days	0	1	0	2
Down Last 60 Days	1	1	0	2

Magnitude - Consensus Estimate Trend

	Current Qtr (6/2020)	Next Qtr (9/2020)	Current Year (12/2020)	Next Year (12/2021)
Current	1- 1	2-80	-53	-48
8 Days Ago	1- 1	2-80	-53	9-03
30 Days Ago	1-32	2-80	-50	9-0
60 Days Ago	1-90	2-82	-84	9-0
40 Days Ago	1-3	2-82	-51	9-09

Upside - Most Accurate Estimate Versus Zacks Consensus

	Current Qtr (6/2020)	Next Qtr (9/2020)	Current Year (12/2020)	Next Year (12/2021)
Most Accurate Estimate	1- 4	2-88	-53	9-0
Zacks Consensus Estimate	1- 1	2-80	-53	-48
Earnings ESP	9-08%	2-85%	0-00%	1-3 %

Surprise - Reported Earnings History

	Quarter Ending (3/2020)	Quarter Ending (12/2019)	Quarter Ending (9/2019)	Quarter Ending (6/2019)	Average Surprise
Reported	0-28	0-98	2-88	1-25	NA
Estimate	0-16	0- 8	3-03	1- 3	NA

Difference	Quarter Ending (3/2020)	Quarter Ending (12/2019)	Quarter Ending (9/2019)	Quarter Ending (6/2019)	Average Surprise
Surprise	65-89%	21-25%	75-95%	710-. 4%	18-8. %

Quarterly Estimates By Analyst

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Annual Estimates By Analyst

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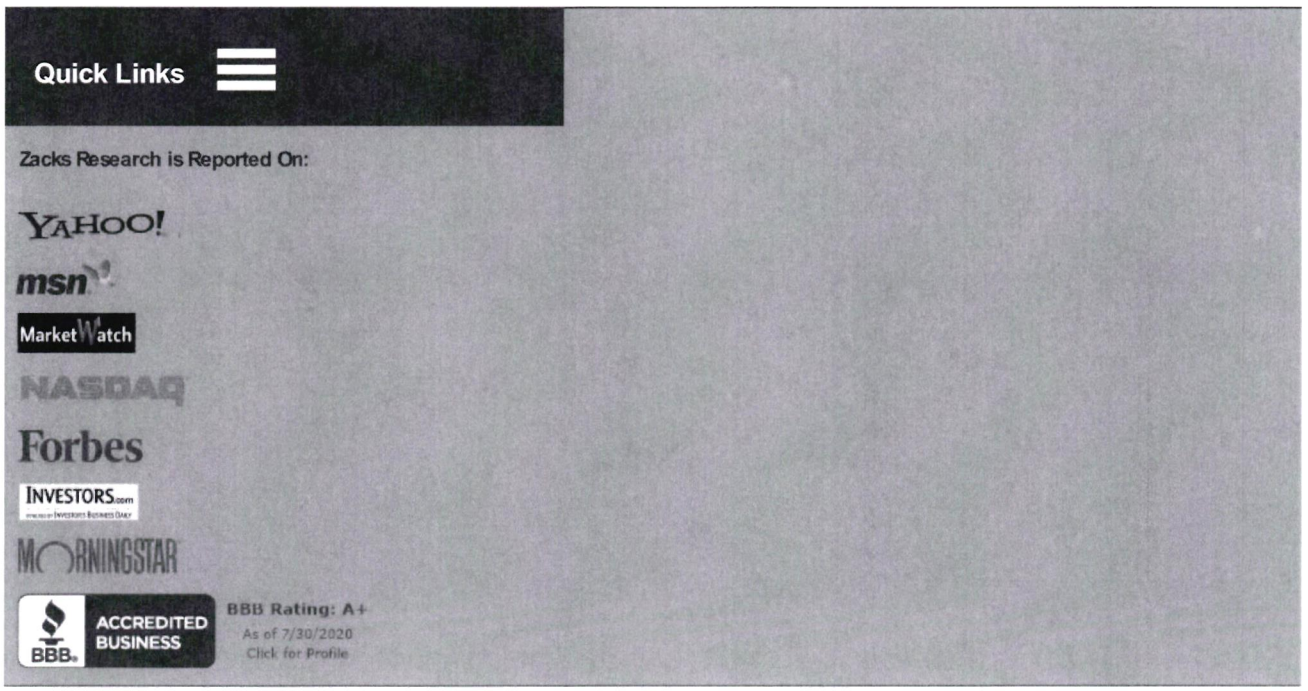

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Next Report Date	*$ea 6 147 1/3
Current Quarter	30@3
EPS Last Quarter	3Q7h
Last EPS Surprise	I N
ABR	70b3

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Earnings ESP	3Q3S
Current Year	%Q3
Next Year	%Q6
EPS (TTM)	%Q7%
P/E (F1)	78QF

*BMO = Before Market Open *AMC = After Market Close

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Current Qtr (06/2020)	- 517	95 1	8 0519
Next Qtr (04/2020)	NA	13530	827567
Current Year (12/2020)	153	8 510	NA
Next Year (12/2021)	- 513	10500	265 7
Past Years	95 0	530	NA
Next Years	6520	95 0	NA
PE	14502	13520	275
PEG Ratio	- 509	2574	NA

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Analyst Snapshot

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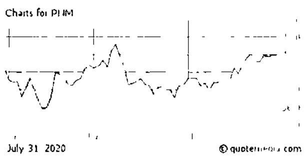

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#avks Consensus Estimate	0500M	NA	NA	NA
Hof Estimates	NA	NA	NA	NA
wg| Estimate	NA	NA	NA	NA
Loy Estimate	NA	NA	NA	NA
Year ago Sales	- - 052- M	7- - 5 4M	15 2B	NA
Year oher Year Groy t| Est5	NA	NA	NA	NA

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	I c.) rts rt vP1?/3?/3»	I Yrts rt v&1?/3?/3»	I c) rtH 2 t v7?/3?/3?/3»	I YrtH 2 t v7?/3?/3?/7»
#avks Consensus Estimate	05 0	NA	2520	2529